TRINIDAD AND TOBAGO.

ADMINISTRATION REPORT

OF THE

DIRECTOR OF AGRICULTURE,

FOR THE YEAR 1927.

TRINIDAD:
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1929.

DEPARTMENT OF AGRICULTURE.

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Overseer (Trinidad) ..... M. D. LUMSDEN, B.V.Sc.
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A. H. PEÑA	St. Patrick	Siparia.

Ground Provisions Depot.

Manager ..... S. A. PARKINSON.

Fruit Depot.

Manageress ..... Miss D. ECKEL.

TRINIDAD AND TOBAGO.

Council Paper No. 1 of 1929.

DEPARTMENT OF AGRICULTURE.

Administration Report of the Director of Agriculture for the year 1927.

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REPORT ON THE DEPARTMENT OF AGRICULTURE, 1927.

Table of Contents.

	PAGE.
General	5
Botanical Department	8
St. Augustine Experiment Station....	12
Chemical Division	16
Government Farms	21
Veterinary Division	26
Public Pastures in Port-of-Spain	29
River Estate	29
Division of Plant Pathology	33
Agricultural Education	37
Tables :—	
I. Revenue and Expenditure, 1927	40
II. Principal Agricultural Exports, Trinidad and Tobago	41
III. Annual Rainfall, Port-of-Spain, Trinidad	42

DEPARTMENT OF AGRICULTURE.

Administration Report of the Director of Agriculture for the year 1927.

Council Paper No. 1 of 1929. *M.P. No. 5661/1928.*

HON. COLONIAL SECRETARY,

I have the honour to submit, for the information of His Excellency the Governor, the report for 1927 on the Department of Agriculture. I regret that the report is so late but for the whole of this year (1928) the Department has been without an Assistant Director and an Entomologist. The Agricultural Chemist has also been absent on normal long leave for six months. The occurrence of Witch-broom disease of cacao has thrown a very large amount of extra work on the Mycologist and myself, with the result that the whole machinery of the Department has been put out of gear.

STAFF.

I was away on leave for five months, about six weeks of which was given up to attendance at the Imperial Agricultural Research Conference. Mr. Urich acted as Director during my absence.

Mr. F. W. Urich, Entomologist, retired on 21st November after 33 years in the Colonial Service, to take up the post of Assistant Professor of Entomology in the Imperial College of Tropical Agriculture. It was decided not to fill the post, pending settlement of working relations between the Imperial College and the Department. This, together with the similar decision when Mr. W. Nowell, Assistant Director and Plant Pathologist, left in 1926, severely handicaps the working of the Department in the meantime.

Mr. R. J. Link, who had been in poor health for some long time, retired on 31st October from the post of Manager of the Government Farm and Officer-in-Charge of the Botanic Station, Tobago. Mr. J. Blackman acted until the close of the year when the appointment was still unfilled.

Mr. G. A. Salomon, the Chief Clerk, was absent due to severe illness for 8½ months during the year.

As the result of these events the Department was much worse staffed than it had been at any period in its history, which was particularly unfortunate at a time when the Froghopper Investigation Committee, co-operation with the Imperial College, the Fruit Industry, the special Cacao beetle and Mongoose campaigns, preparation of material for the Imperial Agricultural Conference and other matters made heavy increased demands on the Head Office Staff.

REVENUE AND EXPENDITURE.

In the Government Estimates for 1927 the sum voted for expenditure was £40,255 19s. 0d. This is frequently quoted as the cost of the Department. It includes, however, a number of grants made to other bodies, *e.g.*: the Imperial College of Tropical Agriculture £8,100, the Agricultural Society £600, the Imperial Bureaux of Mycology and Entomology £200, making a total of £8,900.

The Department also in 1927 earned revenue to the extent of £19,099 1s. 6d. and the Sugar Manufacturers' Association contributed £1,606 15s. 9d. to the Froghopper Investigation and Mongoose campaign. The actual expenditure on the Department itself (*i.e.*: exclusive of the grants to other bodies) was £36,300 15s. 10d. and when the earned revenue and contributions as given above are deducted, the actual cost of the Department for the year is seen to be £15,594 18s. 7d. including the cost of the Froghopper Investigation and the special Mongoose and Cacao beetle campaigns.

PRINCIPAL CROPS.

The quantities and values of the chief agricultural exports during 1927 are given in Table II (p. 41). The following summary gives comparative figures for the last five years of the three staples on which the welfare of the Colony so largely depends.

	Cacao.		Sugar (1)		Coconuts (2)	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	lb.	£	Tons.	£	No.	£
1923	67,692,267	1,286,494	35,523	1,167,518	52,104,682	190,123
1924	56,402,755	1,165,816	43,423	1,321,417	45,351,339	222,764
1925	47,476,609	1,257,255	60,648	1,203,203	41,964,788	192,830
1926	50,067,881	1,270,335	65,680	1,109,408	50,343,619	206,771
1927	51,934,857	1,671,883	41,805	864,562	46,573,459	170,295

(1) The quantity of sugar exported is given, but under values those of the by-products of sugar exported are included, viz.: rum, molasses and bitters.

(2) Coconuts are exported as whole nuts, copra and oil. To obtain comparative figures of annual crops 1 lb. of copra is taken as equivalent to 3 nuts, and 1 gallon of oil to 45 nuts.

As last year, attention has to be directed to very abnormal weather conditions with their resultant effects on agriculture. The year 1926 was characterized by a very unusually severe dry season. At St. Clair Experiment Station the rainfall for the first five months was only 3·97 inches compared with an average (over 65 years) of 11·28. In 1927 the rainfall in these same five months was 24·96 inches. In 1926 the remaining seven months were unusually wet, 64·71 inches fell bringing the total for the year to 68·58 or about five inches above the average. In 1927 the rainfall for the latter seven months was not so excessive, but the total for the year came to 81·07 inches which has only been six times exceeded since 1862; the last occasion being 1892. (*See* Table III p. 42.) The effects of these abnormal conditions on cacao, sugar, &c., are referred to below.

Sugar.—In 1926 the crop reached its record of 73,561 tons, *i.e.*: total production, in spite of severe damage by Froghopper (*Tomaspis saccharina*) in certain districts. There were hopes of an equally good crop in 1927. Unfortunately the heavy rains through the "dry" season, resulted in very low sucrose content in the canes, and also made the work of reaping and transporting the canes so difficult, that over 70,000 tons of cane were left uncut. The result was a fall in sugar production from 73,561 to 51,982 tons and in export from 65,680 to 41,805 tons. The injurious results will not be altogether confined to the 1927 crop, as the damage done to the soil during reaping operations in very wet weather and the rains themselves, caused the ratoons to spring badly. On the other hand the 1928 crop will have the advantage of the "standover" canes which could not be reaped.

The wet "dry" season provided conditions very unfavourable to the Froghopper and no very serious damage was done by this pest in any district.

The felling of cacao on areas, not the most suitable for this crop, continues, sugar cane taking its place, notably in the Caroni district, and up the Caparo Valley. The Ste. Madeleine Company is putting down a light railway to tap very fertile lands at the back of the Oropuche Lagoon.

Sugar, unlike cacao, is a short-period crop, and the increased production of the last three years was due to the condition of improved stability which appeared to have come to the sugar industry. Unfortunately at the time of writing this has not been maintained.

The Froghopper Committee continued its work (*see* p. 36).

CANE FARMERS.—Nearly half the sugar produced is obtained from Farmers' canes, grown by persons who sell to the factories. In 1921 and onward there was considerable unrest and dissatisfaction amongst many of the farmers, following the years of inflated prices. In 1921 a uniform sliding scale of payment was agreed upon by all the larger factories, and in 1924 the factories further agreed on what is known as the limitation of areas. In 1925 a Government Committee, of which I was Chairman, was appointed to enquire into certain grievances. Its report was published as Council Paper No. 70 of 1926. The first outcome of the Committee's report has been the appointment by His Excellency the Governor of a Cane Farming Standing Committee under the Chairmanship of the Hon. Sir Francis Watts, K.C.M.G., on which Factory Owners, Cane Farmers and the Department of Agriculture are represented, with the object of promoting good relations between the two partners in the industry. The nature of the difficulties to be dealt with may be gauged by the fact that there were in Trinidad in 1927, 19,385 people returned as cane farmers (*i.e.* : who sold canes to factories), and although there were several producing from one to five or more thousand tons, the average production for the group was less than 15 tons of cane each.

The proportion of sugar made from estate and farmers' canes during the last five years is as follows :—

	From Estate Canes.	*From Farmers Canes.*		*Total.*
1927	28,001 tons.	23,981	(46 per cent.)	51,982 tons.
1926	39,489 ,,	34,072	(46 per cent.)	73,561 ,,
1925	38,993 ,,	30,636	(44 per cent.)	69,629 ,,
1924	30,862 ,,	21,183	(40 per cent.)	52,045 ,,
1923	24,251 ,,	17,368	(40 per cent.)	41,619 ,,

CACAO.—The crop was nearly 2,000,000 lb. greater than in 1926 and approximately £400,000 more in value. Climatic conditions were on the whole very favourable and helped many areas to recover from the disastrous effects of the drought of 1926, and the very general lack of proper attention in the preceding years of very low prices. The felling of cacao in the less suitable districts, to be replaced by sugar cane, has continued. In some other areas owners do little or nothing pending possible oil developments, so that the attainment again of the crop for the record year 1921, 75,000,000 lb. is still remote. It could be done, however, if known improved methods of cultivation and plant sanitation were more generally practised. There are signs of progress in this direction. More planters are taking an interest in the Department's work at River Estate and putting into practice the methods adopted there which are now showing profitable results. One of the most serious causes of loss is Black Pod Disease, largely due to overshading and inadequate drainage.

The drought of 1926 caused a great increase in damage done by the Cacao beetle (*Steirastoma depressum*) in certain districts, and a special temporary staff was appointed to wage a campaign against it (*see* p. 36).

COCONUTS.—This crop shows a decline of nearly 4,000,000 nuts from that of 1926. This is doubtless only a temporary check due to the preceding drought.

COFFEE.—The crop was a poor one, 163,900 lb. compared with an average of approximately 530,000 lb. for the three preceding years. This was due to unfavourable weather. Planting is actively proceeding, but unfortunately the idea that coffee is a crop which can be grown in any odd place, and particularly under heavy cacao shade is so deeply rooted that in many cases only very poor returns can be expected. It still has to be recognised that an acre of coffee and an acre of cacao cannot both be grown with profit on one acre of land.

FRUIT.—Attention has gradually been focussed on grapefruit as a probably profitable export crop and plantings have been extended (*see* also p. 9) otherwise there has been no material change in the position as reported last year.

RUBBER.—With the decline in coffee, Para rubber regained its old place as the fourth product of importance, with an export of close on 142,000 lb. worth £11,625.

LIMES.—The export of concentrated lime juice remained small, but the rise in the price of lime oils came as a boon to this minor industry, and 104 gallons worth £1,454 were exported.

In the Department work has been continued with the object of producing a hybrid between the West Indian lime and one of the introduced species which would meet trade requirements and be immune, or highly resistant, to Wither-tip disease. The results are encouraging. (*See* p. 10.)

AGRICULTURAL PROGRESS OF TOBAGO.

In last year's report I pointed out how in just under thirty years the agricultural exports of Tobago had risen from £14,503 to £100,703. This year the value has jumped to £207,739. The real increase is apparently not so great, as the Sub-Collector of Tobago in forwarding the returns, whilst noting that 1927 was a good year, with crops much above the average and better prices, stated that the records have also been more carefully kept. Assuming the present figures accurately represent the true state of affairs it is gratifying to point out the increase from approximately £14,500 in 1897 to £208,000 in 1927.

The principal items were :—Cacao £140,477, Coconuts and Copra £27,507, Vegetables and Fruit £21,423, Live Stock £17,022. The two latter are disposed of in Trinidad, the others included in exports of the Colony.

AGRICULTURAL CREDIT SOCIETIES.

One new Society was registered during the year, making the number in operation 35. With very few exceptions all have continued to do good work in recovering from the difficult position created by the long period of depression which followed so soon on the boom during which many of them started. They are steadily surmounting their difficulties and their prospects for good work in the near future are becoming brighter.

One group of societies about Debe, composed of cane farmers, have done exceedingly useful work in arranging between the members for better regulation of the delivery of canes thus avoiding a loss of time which is such a frequent cause of complaint in other districts.

AGRICULTURAL BANK.

The Department has continued to give assistance to the Government Agricultural Bank founded in 1925, as shown by the following extract from the Annual Report of the Bank (C.P. 16/1928).

"The Officers of the Department of Agriculture continue to inspect and report on the properties mortgaged to the Bank. Copies of the reports are forwarded to the owners whose attention is drawn to the recommendations made therein. In the majority of cases the advice given by the Inspectors is adopted, resulting in improved cultivation and increased output.

"The Board again wishes to place on record its appreciation of the services of the Officers of the Department of Agriculture."

This work is becoming an increasingly important means of improving the standard of agricultural practice in the Colony, as steps can be taken to ensure that the advice given is put into practice.

BOTANICAL DEPARTMENT.

The following are the principal matters reported by Mr. R. O. Williams, Superintendent and Assistant Botanist :—

GOVERNMENT HOUSE GROUNDS.

These have been attended to as usual, the labour supply being principally prisoners. The prison gang was considerably below its authorised strength. An Acalypha hedge was substituted for Hibiscus which had been killed by nematodes. A carap tree died and was removed.

Royal Botanic Gardens.

As a consequence of the unusually wet year there was considerable improvement in many plants which had suffered much from the previous year's drought, for example, nutmegs, mangosteens, Amherstia and Monodora. Fern growth in the ravines also developed considerably and added much to the beauty of the gardens.

The continuous rains allowed of no cessation in grass cutting but was of benefit in controlling the epidemic of mole crickets from which the lawns suffered for several years past.

The Talipot palms having finished fruiting were removed and replaced by Coco de Mer (*Lodoicea callipyge*). The latter, introduced from Demerara in 1926, have now commenced to germinate. Two were also planted in the palm avenue.

Callichlamys riparia has grown and flowered well at the western end of the gardens. It is of interest to note that during the year it was found to be a native plant growing abundantly on forest growth by the roadside in the south of Trinidad.

The orchid collection has continued to improve and increase. Notable amongst exotics is *Coelogyne pandurata* which grows and flowers in profusion

Several interesting or ornamental plants have been put into permanent situations during the year, *viz.*: *Musa coccinea* and *Musa* sp. from Sumatra, *Araucaria Bidwilli*, *Lonicera Hildebrandtii*, *Buddleia madagascariensis*, *Mussaenda erythophylla*, *Tinnaea aethiopica*, *Vernonia idiocalyx*, *Ilex paraguensis*, *Lecythis Sabucaijo* and *Cyrtostachys Renda*.

Pseudoeranthemum seticalyx introduced from Kew in 1926 has made a useful, semi-permanent, bedding plant.

Hydnocarpus Wightiana planted in 1926 has grown well.

Two well grown specimens of *Deckenia nobilis* developed a form of bud-rot. A fine old specimen of *Araucaria* had to be removed as it had become dangerous.

A new supply of labels was ordered and put out, special attention being given to the labelling of the ferns and orchids.

A more strict enforcement of the gardens regulations as regards closing hours was undertaken by the police.

An illustrated *Guide Book* to the Gardens was published and has found a ready sale.

St. Clair Experiment Station.

As usual the main work has been in the plant nursery. The distribution of plants and the revenue received from the sale of same has increased rapidly during the past few years partly due to an increased demand for fruit trees. The year 1927 showed a still further advance, particulars of which are given below. It was found necessary to apply for an increase of £200 to the vote for maintenance to enable current orders to be filled and to extend the Grape Fruit nurseries in readiness for 1928 orders. This was approved. A prison gang continued to work regularly at St. Clair but the number of prisoners was few during most of the year.

The total number of plants sent out was 151,317 as compared with 123,482 in 1926. The increase is largely accounted for by the sale of 24,000 more cacao plants. The distribution of coffee plants and fruit trees remained steady with the exception of grafted mangos which increased by about 1,300. Seven special Wardian cases, were despatched to distant parts of the Empire.

The revenue received at St. Clair during the last five years is as follows :—

	£	s.	d.
1923	687	9	0½
1924	1,027	2	1½
1925	1,182	3	0
1926	1,289	12	7½
1927	1,731	4	3

The details of plants, seeds, cuttings, &c., distributed in 1927 are given below—

Cacao	Seedlings in pots	70,732		
	Seedlings from beds	2,000		
	Budded	1,013		
			73,745	
Coffee:	Robusta	18,420		
	Excelsa	19,168		
	Arabica	3,860		
	Canephora	9,810		
			51,258	
Fruit	Citrus (budded)	..		
	Marsh Grape Fruit	2,540		
	Assorted Grape fruit	315		
	Oranges	1,830		
	Mangos (grafted)	3,140		
	Avocados (budded)	282		
	Limes	6,104		
	Pineapples	2,075		
	Miscellaneous	2,228		
			18,454	
Timber Trees			785	
Other Economic Plants			901	
Decorative Plants			6,174	
Total number of plants			151,317	
Budwood			1,840	pieces.
Budding Tape			61	yards.
Cuttings			11,727	
Seeds—				
Coffee		146 lb.		
Miscellaneous		69 lb.		
			215	lb.
Seeds (Countable)—				
Mahogany		63,700		
Miscellaneous		40,400		
			104,100	
Seeds (Packets)				
Miscellaneous			165	
Fruit			3,753	
Produce			445	lb.
Soil and Turf			59	loads.

Assistance was extended to planters in Trinidad and Grenada in budding and grafting fruit trees.

The fruit crop at St. Clair was poor, as it was throughout the Colony, on account of unusual rains, 81·07 inches as compared with the average of 63·61.

Elephant Grass.—This is now well established throughout the island and the demand for plants has therefore decreased.

Giant Bananas.—Only the smaller of the two plots now remains, the larger being sold out for planting material.

Lime Hybrids.—No further hybridisation work was possible this year owing to the irregularity or failure of the Citrus trees to produce flowers due to adverse weather conditions.

The cross previously recorded between *Citrus aurantifolia* No. 1013 as the male parent and the West Indian lime as the female has given the following interesting results.

From about 20 plants raised seven have so far shown no sign of wither-tip. These plants are distinct and show characters intermediate between the two parents. No opinion can of course yet be given as to their commercial importance. The remainder which are very like the West Indian lime have suffered badly from wither-tip disease.

The seven immune plants have been propagated by budding and about 50 plants of each raised for further trial in Trinidad and also distributed to the islands of Dominica and St. Lucia. Future work will consist in breeding the progeny of this cross with the ordinary lime, the aim being to get a lime as similar as possible to the West Indian with the resistant characters to wither-tip of *C. aurantifolia*.

CAMPHOR.—Seeds of the solid-yielding form of camphor were received from the Director of Kew and 50 plants supplied to the Forestry Department for planting in the Forest Reserve.

CHAULMOOGRA OIL PLANTS.—Two further consignments of seeds were received during the year from Siam and a Wardian case of plants from Kew Gardens. These have mostly been sent to River Estate and a few to the Chacachacare Leper Settlement.

DERRIS ELLIPTICA.—Plants of this were propagated and sent to River Estate where it appears to be growing satisfactorily.

OVERSEER'S OFFICE.—A new overseer's office was built by the Public Works Department.

MOSQUITOES.—Constant attention has been paid to mosquito control and sanitation in general. Assistance in this work was also received from the Medical Department. The Station remained practically free of mosquitoes throughout the year, but complaints of heavy infestations in the neighbourhood of the Station continued. The source of these is evidently outside the Station.

COLOURING ORANGES.—Experiments were conducted on a small scale with colouring oranges by treatment with ethylene gas.

IMPERIAL COLLEGE OF TROPICAL AGRICULTURE.—Two mornings were spent by the students of the Imperial College of Tropical Agriculture at St. Clair when the various kinds of work done there were explained to them. Botanical specimens for class work were also supplied.

STORM DAMAGE.—Heavy rainfall caused the flooding of the Maraval River doing damage to the banks, a portion of 50 feet more or less long by 10 feet deep fell away leaving a narrow footpath of 4 feet.

General.

Memoir No. 4 of the Department of Agriculture entitled *The Useful and Ornamental Plants of Trinidad and Tobago* by W. G. FREEMAN and R. O. WILLIAMS was published during the year.

TOBAGO.—Two visits were paid to Tobago. The Botanic Gardens were inspected and there was a general improvement in their condition at the close of the year.

ADVISORY WORK.—Advice was given to planters and others on many subjects relating to various crops, particularly fruit.

LECTURES.—Papers were read at the Agricultural Society on Grape Fruit and Coffee and a lecture on Coffee given to both the Leeward and Windward Agricultural Societies in Tobago.

SCHOOL GARDENS COMPETITION.—The final judging in this competition was done as usual, the Agricultural Medal being awarded to Torrib Trace C. M. School.

Herbarium.

The herbarium and botanical library was moved from the old wooden building to the new unfinished office. The change is a great improvement and allows much better facilities for study.

FLORA.—The work of writing the flora has been continued as time and opportunity permitted but pressure of other work has allowed little time during official hours to be devoted to it. The manuscript of the following families was prepared during the year, *Cruciferae, Capparidaceae, Violaceae, Bixaceae, Flacourtiaceae Caryophyllaceae, Portulaceae, Quinaceae, Hypericaceae, Guttiferae, Marcgraviaceae, Theaceae, Bombacaceae and Sterculiaceae.*

Approval for printing the Cohorts *Ranales* and *Rubiales* was granted and these are now in the press.

Grateful acknowledgment is here accorded the Directors of Kew and the New York Botanical Gardens for much help in comparing and identifying specimens.

The work began last year for the Forestry department was continued. This consist in the drying and identifying of plants sent in by their collectors. These specimens were subsequently sent to the School of Forestry, Oxford University, by the Conservator of Forests and the identifications verified. Identifications were made for various other enquirers including the members of the Imperial College of Tropical Agriculture.

Botanical collecting was conducted in the following districts: St. Ann's, Chacachacare, Patos, Woodbrook, Mayaro, Teteron's Bay, Quare Reservoir, Aripo Savannah, Oropuche, Blue Basin, Aripo Valley, Long Stretch, Mora Forest, Cocal, Morne Bleu, Piaco Savannah, Caura, Sans Souci, Siparia, Cedros, Erin and Tobago. The most extensive collecting was done in Tobago. Several collections have been made in the course of visits during the last few years and the Tobago flora is now becoming well represented in the herbarium.

A total of 223 sheets were collected during the year and 300 laid in the cabinets. Duplicates of these have as far as possible been sent to Kew and the New York Botanical Gardens. A new cabinet was purchased.

ST. AUGUSTINE EXPERIMENT STATION.

The following notes are summarized from a detailed report by the Manager, Mr. L. A. Brunton :—

The raising of new Trinidad Seedling canes continues to be the principal work, together with the study of problems in connection with cane cultivation, particularly trials of cover crops and other crops of possible economic value.

Sugar Cane.

AVERAGE YIELD —1,872 tons, 1 cwt. were reaped from 58·65 acres, an average of 31·91 tons per acre: Plant canes gave an average of 51·11 tons; 1st ratoons, 30·19; and 2nd ratoons 22·24.

The highest yield, 58·7 tons per acre was obtained from 1·75 acres divided into 111 plots of new Trinidad Seedling canes. Java Unknown gave the highest yield, 128 tons per acre from a plot of 1/30 of an acre, and the yield from three plots of this cane, totalling about 1/7 of an acre, in three different fields was 74·33 tons per acre. B.H. 10 (12) a very superior cane, was only slightly behind with an average of 72 tons per acre on eight plots in five different fields; one of the plots gave 98·17 tons per acre.

Cultivation Experiments.

PLANTING EXPERIMENT.—The experiment on methods of planting started in 1923 with Ba. 6032 and B.H. 10 (12) on quarter acre plots was reaped this year as second ratoons. Plot 2, pen manure applied at the time of planting, dropped this year from first place to third and fourth place respectively in B.H. 10 (12) and Ba. 6032, but the average of the three crops, plants, first and second ratoons, still shows an increase over plot three, in which manure was applied three to four months after planting, of 3·9 tons in Ba. 6032 and eight tons in B.H. 10 (12) per acre.

DRAINING EXPERIMENT.—The extension of the draining experiment to include an undrained area of approximately 3 acres in comparison with 2·5 acres with drains at 44 feet apart was reaped this year. The drained area gave 4·96 tons per acre more than the undrained area. The amount of rotted canes in the undrained area was marked.

COVER CROPS.—The growing of cover crops previous to planting cane, and as a green dressing with the cane, has received attention for a few years. During the past three years twenty-eight varieties of plants, mostly leguminous, have been under trial as cover crops. Several of these, when given a start ahead of local weeds and grasses, make quite effective covers, but only three are able to compete on anything like equal terms with local wild growths; these are *Crotalaria juncea* (Sun Hemp) a short time cover, flowering in six weeks from time of sowing; *Stizolobium aterrimum* (Bengal Bean) and *Cajanus indicus* (Pigeon Pea) medium

covers, flowering within four months from sowing. *Tephrosia candida*, which flowers in about nine months, is a promising long time cover, which, however, has not yet been thoroughly tried out by sowing broadcast. Two recent introductions from Ceylon and the Federated Malay States, *Crotalaria usaramoensis* and *Calopogonium mucunoides* also give promise of being good short and medium time covers respectively.

The season this year was peculiarly unfavourable to broadcast sowing; much of the seed sown rotted, before germination, on account of the continuous rains, resulting in a total loss of some varieties or a poor yield.

Froghopper Experiment.—Both fertilized plots were more severely attacked by froghoppers in 1926, after the application of fertilizer for the third year in succession, than in any previous year since the commencement, in 1924, of this experiment to determine the effect of yearly applications of nitrogenous fertilizers on froghopper attacks; the adjacent control plots remained practically free from attack. The sodium nitrate plot appears to have suffered most, the yield being 3·91 tons per acre less, while the ammonium sulphate plot yielded 2·91 tons more than their respective control plots.

This year (1927) the ammonium sulphate plot received its fourth successive application, but as sodium nitrate could not be obtained the application to this plot had to be omitted. The most severe froghopper attack was experienced this year, commencing in the fertilized plots it spread to the controls and subsequent throughout the field and into an adjoining field.

Manurial Experiments.

Whale Meal.—Reaped this year as 2nd ratoons, 19 months after the application of this fertilizer, 300 lb. to the acre, the yield of each of the five varieties fertilized shows an increase over their respective controls varying from ·72 to 4·48 tons per acre, and an average increase for the two crops of from 1·16 to 4·29 tons per acre.

Ground Limestone.—In May, 1925, ground limestone 2 tons per acre was applied to a field of 5·5 acres, five months before the field was planted in cane. The yield of plant canes this year was 55·63 tons per acre, an increase of 31 tons over the last crop of plant canes reaped from this field in 1919. Although the whole of this amount cannot be placed to the effect of the limestone, as there was a general increase in yield over previous crops on all fields, comparison with the same varieties reaped from other fields shows that at least 30 per cent. of the increase may be safely attributed to the beneficial effects of the limestone.

H. O. P. Compound Fish Manure.—In July, 1926, this fertilizer was applied at the rate of 4 cwt. per acre to approximately 1/20 acre plots of two varieties of Trinidad seedling canes. Reaped as 1st ratoons eight months later, the fertilizer plot of one variety yielded nearly 7 tons per acre less, while that of the other variety yielded over 4½ tons per acre more than their respective control plots.

New Trinidad Seedlings.

3,829 seedlings raised in 1926 were planted out during March and April, 1927. Seed was collected from twenty-two varieties, twelve of which germinated, Bourbon and T. 1022 germinated very freely yielding between them 6,240 of the 8,568 plantlets pricked off by the end of the year; T. 735, T. 2009 also germinated well and B. 6835 fairly well yielding 720, 600 and 480 respectively, the remaining 528 plantlets were raised from seeds of Ba. 11569, H?. Cuban and crosses of 3922, XT. 650 and C. O. 213, XT. 608.

Selection of field characters and chemical test of seedlings previously raised resulted in 2, 6, 2, 27, 40, 12, 65, and 271 of the seedlings raised respectively in 1917, 1918, 1919, 1920, 1921, 1922, 1923 and 1924 being retained for further trial, in addition a first selection of 88 was made from seedlings raised in 1925. The number of sugar cane samples sent to be tested amounted to 1,591. Five new selections, one of the 1920 and four of the 1921 seedlings were distributed to sugar estates for trial, 3,000 plants having been divided between five estates and the Imperial College of Tropical Agriculture, these canes show an average

yield per acre for three crops of over 31 tons of cane and over 3·5 tons of sucrose in juice. Visits were paid to the sugar cane estates to which plants of 23 new varieties have been distributed since 1923. Five showed good promise in growth and general appearance on all the estates visited, and ten others on two or three estates. A joint full report by the Agricultural Chemist and the Manager of the Station has been prepared (*see* also p. 16).

Mosaic Disease.

This disease is now thoroughly under control due to the weekly "Rogueing" which has resulted in the destruction during the year of only 18 stools on 79·79 acres containing 152,516 stools, an infection of only 0·0118 per cent., a substantial decrease on the previous year of 0·0532 per cent.

Other Crops.

All other crops have received the usual care and attention during the year.

HEVEA RUBBER.—The average girth of the trees increased during the year to 37·95 inches an average increase of 1·85 inches. Tapping by the quarter-cut system, nine inches from the ground, every second day, as in the previous year has been continued. The average yield of dry rubber per tree for six months, July to December was 1·06 lb. Plot P. gave 1·40 lb. per tree and Plot R (trees of less girth) only 0·89 lb. per tree.

CACAO.—The general crop shows an increased yield over last year of 34 per cent. The Budded plot continued to decrease in yield being 27 per cent. less than last year and 33 per cent. less than in 1925.

CITRUS GROVE.—The seventy-two orange trees yielded 1,266 fruit, an average of 18 per tree. Parson Brown gave most with an average of 32. With the exception of Hart's Tardiff Late all were, as in the previous year, although juicy, quite tasteless, the Washington Navel being in addition "Corky" and juiceless.

Sixty-nine grapefruit trees bore 3,659 fruit, an average of 53 per tree, Marsh was first with an average of 89. In June one of the two beds of each variety received an application of seven pounds "Ammo-phos" per tree and of four varieties 1·5 lb. of sulphate of potash as well; the application was repeated in December. A record of the size and weight of fruit from each plot was started in September, but full results will not be available until 1928. Scale insects were very much less troublesome during the dry season this year and were easily kept in control by spraying.

BANANAS.—The crop reaped from approximately 3·5 acres amounted to 1,432 stems; 1,000 of which were Governor, 325 Giant and 107 Congo bananas, showing that 90·9, 90·2 and 77·5 per cent. respectively of the plants bore fruit. An increase in the percentage of nine hand bunches was noticeable this year, being 7·7 and 3·5 per cent. for Giant and Governor respectively as against 0·48 and 0·28 last year.

The results of the Whale meal manurial experiment on Governor bananas, started in September 1925, show a slight increase of 1·4 per cent. of full bunches, *i.e.*: 8, 9 and 10 hands and a marked increase of 5·6 lb. in the average weight of these bunches, over the control plot. The plots of Governor bananas to which H. O. P. compound fish manure was applied in July, 1926, at the rate of 2 and 3 cwt. per acre, show an increased yield over the control plot of 49·4 and 4·1 per cent. of full bunches respectively, and an increase in the average weight of these bunches in the 2 cwt. plot of 2·05 lb. but no appreciable difference of weight in the 3 cwt. plot. The two plots of Giant bananas to which 3 and 4 cwt. of this fertilizer were applied, show, in the 3 cwt. plot, a difference in favour of the control plot of 5·8 per cent. of full bunches, but an increase in the average weight of the bunches of 5·7 lb. in the manured plot, while in the 4 cwt. plot this order is reversed, the average weight per bunch being 2·5 lb. less and the percentage of bunches 22·22 per cent. in the manured plot.

Four out of the five stools from which stems, apparently attacked by "Panama" disease, were destroyed at the beginning of 1926, the remainder of the stool being kept under observation, have remained healthy. The fifth stool which showed signs early in the year of a recurrence of the disease was destroyed. There has been no more splitting in the three stools from which splitting stems were dug out, but two out of the three show a rather weak growth.

Cotton.—Sea Island cotton suffered again from leaf rust and the crop was only 90 lb. of lint per acre as against 185 lb. in 1926. Continuous row planting gave a small increased yield over spaced planting 7·7 lb. lint per acre, and planting on the level gave 25·2 lb. more per acre more than planting on ridges. The ratoon crop of Cauto Cotton yielded 103·14 lb. of lint per acre, 20 lb. less than the plant crop reaped the previous year.

Pigeon Peas.—497 plants in the 29 progeny-rows planted in 1926 fulfilled the requirements of ripening all their pods together. Seed from the two heaviest yielders were replanted in progeny-rows, and the remainder of the seed from the selected plants in these two rows planted in increase plots. Owing to very heavy rains just after sowing the seed, germination was very poor and only 69 plants from 1,100 seed reached maturity. Both "Arahar" the Indian dwarf pigeon pea, and the Hawaiian pigeon pea, suffered from the weather. The germination of the former was so poor that only one-fifth of the original plot planted reached maturity. The yield of the latter was seriously affected by delayed planting, necessary in order to catch a favourable spell of weather.

Pineapples.—During the year the cultivation of pineapples as an intercrop in the Citrus grove was extended to 8,237 plants, 28·31 per cent. of which bore fruit, yielding a crop of 2,332 fruit. The percentage of sound marketable fruit was 42·5 the remaining 57·5 per cent. being either diseased, damaged, or "gummed" from the attack of *Tmolus echion*. Of the four varieties planted Red Spanish shows the highest percentage of bearing plants (46·8) of good sound fruit (48·7) and of "gummed" fruit (34·8). Sugar loaf the lowest percentage of bearing plants (22·5) and Chocona the highest percentage of diseased plants (13·3) and the lowest of "gummed" fruit (18·5).

Fertilizer tests were started during the year, the results so far indicate a slight increase in the average weight of fruit from the fertilized plots, but it appears that the percentage of bearing plants is principally governed by careful selection of plants. A full report on pineapple cultivation is in course of preparation for publication.

Miscellaneous.—With the exception of Upland rice and ground nuts, the latter planted in December, the usual crops of yam, swamp rice and cassava, suffered severely from unfavourable weather, and in consequence gave much reduced crops. Jute although planted in July and germinating freely, failed to compete successfully against grasses and weeds, and in spite of an average rainfall of 8 inches a month during the five months of its growth flowered and seeded when less than two feet in height. Soya bean of which a supply of seed was reaped the previous year failed entirely to germinate ; a new plot was planted late in December with seed secured from the Manager of Orange Grove Estate. Another fibre plant *Urena lobata* was also tried but failed to establish itself against competing weeds and grasses.

Diseases and Insect Pests.—This year's froghopper attack was the severest experienced since the experiment with nitrogenous manures was started, spreading as it did throughout the field in which the experimental plots are situated and into an adjoining field. Only a few citrus trees were infested with scale insects during the recurrent attack in the dry season. The attack on pineapples of the Lycaenid moth, *Tmolus echion* was severe, but was slightly checked by catching the adult moths, and a single spraying with Bordeaux mixture, aided no doubt by the vigorous growth of the plants, appeared to have held in check, in spite of the heavy rains, the fungus *Thielaviopsis paradoxa* which made its

appearance late the previous year. A very severe attack of leaf rust of Sea Island cotton effectively precluded any hope of reaping an average crop. The absolute control of Mosaic disease may now be claimed, a steady decrease in the percentage of infection having been maintained for the past five years, *viz.* : from 0·09 per cent. in 1923 to 0·0118 per cent. in 1927.

GENERAL.—As in previous years the urgent need for a proper store room is again emphasized, not only to safeguard produce implements, tools, &c., but also to enable selected seed, &c., for experimental work to be safely kept so as to prevent destruction by rats and the mixing of different varieties. Trespassing, chiefly for the purpose of cutting grass, after the station is closed for the day, is a constant source of annoyance on account of the damage done to cultivation ; out of five arrests four convictions were secured one of which was for malicious damage. The thanks of the Department are due to the authorities of the following estates for their assistance in supplying cane seed, Ste. Madeleine Company, Forres Park, Brechin Castle, Caroni and Orange Grove.

The Imperial College of Tropical Agriculture continues to avail itself of the facilities afforded by the Station for research work and demonstrations to students.

The actual revenue fell short of the revised estimate by £104. 6s. 4d. on account of the canes having realised only $3.38 instead of $3.60 a ton, and the sale of about £50 worth of cotton not having been effected by the end of the year.

Revenue and Expenditure.

Revenue.

	£	s.	d.
Cane and Cane Plants	1,207	17	8½
Bananas and Banana Plants ..	43	12	4½
Yams	35	11	6
Peas and Beans	5	6	5½
Pineapples and Pineapple Plants ..	31	0	4½
Rice Paddy and Rice Plants ..	12	4	2
Citrus Fruit	10	17	1
Cacao and Cacao Pods	26	18	9
Rubber	4	1	3
Camphor Plants	2	10	5
Molasses	22	9	2½
Miscellaneous	23	4	4½
	£1,425	13	8

Expenditure.

	£	s.	d.
Personal Emoluments ..	372	0	0
Wages of Field Assistant and Office and Field Assistant..	220	0	0
Yam Cultivation	54	7	2
Cultivation "Cane and other Crops"	1,439	19	2
Maintenance	399	19	10½
Travelling	9	18	2½
Materials	194	19	9
Stock	274	2	6½
	£2,965	7	8½

CHEMICAL DIVISION.

Mr. J. deVerteuil, the Agricultural Chemist is largely occupied with the testing and reporting on the canes grown at St. Augustine Experiment Station. He reports as follows :—

Sugar.

TRINIDAD SEEDLING CANES.—The raising of the canes has been continued at St. Augustine Experiment Station. The testing work was done in a small improvised laboratory at the adjoining Government Farm where the canes are crushed in a small Chattanooga mill ; 1,754 samples were so crushed and tested in 1927. Plots of the most promising of the Trinidad Seedlings raised in 1917 were tested for the seventh time as plant canes and for the sixth and fifth time as first and second ratoons. Two only out of this lot, *viz.* :—T. 455 and T. 487 have been replanted at the Experiment Station for reaping in 1929.

Results from the seedlings raised in 1918 have been obtained of six crops as plant canes and five and four crops as first and second ratoons. The best of this series are T. 608, T. 617 and T. 650. They have given an average yield of 3·73, 3·61 and 3·54 tons of sucrose per acre per annum for fifteen crops (six of plant canes, five of first and four of second ratoons) as against 3·91, 2·96 and 2·75 tons for B.H. 10 (12), B. 156 and Ba. 6032 respectively. T. 595, T. 594, T. 547 and T. 619 have also given good results, *viz.* : from 3·40 to 3·53 tons of sucrose per acre per annum.

Results from the 1919 seedlings have been obtained of five crops as plant canes and four and three crops as first and second ratoons. The most promising of these are T. 1022, T. 917 and T. 831 with an average yield of 3·93, 3·50 and 3·38 tons of sucrose per acre per annum for twelve crops (five of plant canes, four of first and three of second ratoons) as against 3·91, 2·96 and 2·75 tons for B.H. 10 (12), B.156 and Ba. 6032 respectively.

Results of the 1920 seedlings have been obtained of four crops as plant canes and from three and two crops as first and second ratoons. T. 1198 has given the best results, *viz.* : an average of 4·21 tons of sucrose per acre for nine crops as against 4·37 tons for B.H. 10 (12). The next best are T. 1188, T. 1320, T. 1189, T. 1353, T. 1236 and T. 1429 and they gave 4·05, 3·81, 3·75, 3·73, 3·73 and 3·69 tons of sucrose per acre for the same period as against 3·19 and 2·91 tons for Ba. 6032 and B. 156 respectively.

Results of the 1921 seedlings have been obtained during the past three years as plant canes ; during 1926 and 1927 as first ratoons and during 1927 as second ratoons. There are several promising canes among this lot, the best being T.1811 with an average of 4·36 tons of sucrose per acre for six crops. It is followed by T. 2019, T. 2110, T. 2020, T. 1807, T. 2009 and T. 1903 with an average of 4·15, 4·14, 4·11, 4·09, 4·03 and 4·01 tons of sucrose as against 4·00 tons for B.H.10(12). Five other varieties, *viz.* :—T. 1995, T. 1893, T. 1891, T. 1839 and T. 1951 have given for the six crops from 3·69 to 3·99 tons of sucrose per acre per annum as against 3·69 and 2·36 tons from B. 156 and Ba. 6032 for the same period.

Comparatively few seedlings were raised in 1922. Plots of plant canes were grown for 1926 and 1927 crops and plots of first ratoons were reaped in 1927. B.H. 10 (12) which was grown among these plots for comparison, gave an extraordinary high yield, *viz.*:—an average of 6·94 tons of sucrose per acre and this is much better than that obtained from any of the seedlings. The four best seedlings out of this lot are T. 2392, T. 2399, T. 2395 and T. 2354. They have given 5·47, 5·22, 4·97 and 4·72 tons of sucrose per acre per annum for the three crops as against 4·55 and 4·53 tons per acre for Ba. 6032 and B. 156 respectively.

A large number of seedlings were raised in 1923, they were grown in plots for the first time and the juice tested in May, 1927. T. 2640 has given the best result, *viz.*:—96·60 tons of cane with an indicated yield of sucrose of 9·18 tons per acre as against 98·17 tons of cane containing 9·06 tons of sucrose per acre for B.H.10(12). Nineteen other varieties, of which T. 2673, T. 2755, T. 2574 and T. 2590 with 64 to 97 tons of canes containing from 7·00 to 8·60 tons of sucrose per acre, have given more than 6·00 tons of sucrose. B. 156 and Ba. 6032 gave 78·37 and 60·22 tons of cane containing 5·65 and 4·08 tons of sucrose per acre respectively. Owing to the very wet conditions prevailing during the 1927 crop season the quality of the juice from the canes was poor but nevertheless it compares favourably with that of B.H. 10 (12) grown under similar conditions ; on the other hand the field returns were exceptionally high. A complete report of all the experiments for 1927 crop has been prepared.

Canes sent out to Estates for trial.

In 1923 a selection was made of the seedlings raised in 1917 and 1918, and cuttings of T. 487, T. 496, T. 519, T. 617 and T. 718 were sent out for trials under estates conditions. The original cuttings are usually grown as nurseries and from these, about 12 months later, as large plots as possible are planted for reaping 15 to 18 months later. In most cases the first crop was badly damaged by Froghopper blight and only two estates sent in returns of plant canes reaped in 1926. These results were published in the *Annual Report* for 1926.

The results for the first ratoons reaped in 1927 are given below. These figures were compiled by the Estate authorities :—

FIRST RATOONS—BRECHIN CASTLE ESTATE.

Reaped 1st June, 1927.
First Ratoons, 12 months old.

Field Ketwarree No. 4.
2 cwt. Sulphate of ammonia per acre.

Variety.	Area planted Square feet.	Tons cane per acre.	Sucrose per cent.	Purity.
T. 718	7,400	26.05	12.90	85.4
T. 519	5,600	23.91	12.00	80.5
T. 487	1,800	21.15	12.29	82.5
T. 617	2,900	17.17	12.34	80.6
T. 496	9,600	15.65	17.35	90.8
B. 4934	3,000	29.10	13.98	87.9

STE. MADELEINE SUGAR ESTATES.

Reaped 10th to 13th May, 1927.
1st Ratoons, 13 months old.

Field Golconda No. 10 (Black Soil).
No Manure to ratoons.

Variety.	Area planted.	Tons cane per acre.	Sucrose per cent.	Purity.
T. 519	1/7 acre	18.37	16.15	88.00
T. 617	1/7 do.	16.80	15.75	86.78
T. 496	1/5 do.	15.99	15.70	89.74
T. 718	4/35 do.	14.50	15.83	89.21
Ba. 11569	4/35 do.	29.40	16.12	90.55
Ba. 6032	1/7 do.	27.60	13.74	82.30
B.H. 10(12)	4/35 do.	26.95	16.79	91.49
B. 156	4/35 do.	17.11	14.56	85.39

STE. MADELEINE SUGAR ESTATES.

Reaped 5th to 7th April, 1927.
1st Ratoons, 12 months old.

Field Picton No. 8 (New Alluvial Soil).
No Manure.

Variety.	Area planted.	Tons cane per acre.	Sucrose per cent.	Purity.
T. 718	6/32 acre.	25.39	16.20	88.28
T. 519	6/32 do.	22.82	14.57	87.54
T. 496	5/32 do.	16.40	18.46	94.46
Ba. 11569	6/32 „ do.	38.40	16.70	89.33
B. 156	do.	32.48	17.39	90.13
B.H. 10(12)	do.	29.63	18.47	91.69
Ba. 6032	do.	29.54	16.03	90.34

In 1925, eight other varieties, *viz.*:—T. 608, T. 650, T. 637, T. 909, T. 917, T. 1188 T. 1198 and T. 1353 were sent out. With the exception of Brechin Castle and Ste. Madeleine Sugar Estates, where the plots were allowed to grow to maturity and reaped in 1927, the canes from the nurseries were cut at the end of 1926 for establishing larger plots.

The preliminary reports received are to the following effect :—

Caroni, T. 1198 is a promising field cane :
Waterloo, T. 1198 and T. 650 are promising well :
Bronte, all the varieties sent are growing well :

The results compiled by the Estate authorities, from the first crop of plant canes reaped at Brechin Castle and Ste. Madeleine Sugar Estates are as follows :—

PLANT CANES—BRECHIN CASTLE ESTATE.

Planted 30th October, 1925.
Reaped 2nd June, 1927.

Field Old Works No. 8.
20 tons pen manure and 2 cwt. Sulphate of ammonia per acre.

Variety.	Area planted Square feet.	Tons cane per acre.	Sucrose per cent.	Purity.
T. 917	800	44.25	14.25	85.3
T. 1188	600	34.50	15.27	89.3
T. 1198	400	34.05	14.80	88.1
T. 1353	500	28.31	15.22	86.9
T. 608	1,600	23.13	17.45	91.8
T. 637	1,200	20.17	15.32	89.1
T. 909	600	19.96	14.80	88.1
T. 650	1,500	14.88	16.13	90.1
S.C. 12/4	400	44.55	14.25	87.9
B.H. 10 (12)	Not stated	34.00	—	—

STE. MADELEINE SUGAR ESTATES.

Planted 23rd November, 1925.
Reaped 17th to 18th March, 1927.

Field Picton No. 31 (Black Soil).
20 tons pen manure per acre.

Variety.	Area planted.	Tons cane per acre.	Sucrose per cent.	Purity.
T. 519	1/43 acre	37.40	14.11	88.52
T. 1188 ..	do.	33.10	15.03	89.99
T. 617	do.	30.90	16.78	91.43
T. 1198	do.	30.90	16.81	91.16
T. 608	do.	29.90	16.71	87.51
T. 637	do.	27.70	15.60	89.64
T. 718	do.	26.60	13.83	86.48
T. 917	do.	25.60	14.86	83.74
T. 1353	do.	24.50	15.47	87.47
T. 650	do.	23.60	13.42	86.19
B.H. 10 (12)	8/43 acre	40.70	16.47	88.16

In 1926, the following varieties were sent out :—T. 1022, T. 1113, T. 1429, T. 2009 and T. 2110. Results from these will not be obtained before the 1929 crop but preliminary reports received from the estates are to the following effect :—

Waterloo Estates, T. 2009 and T. 2110 are growing very well.

Ste. Madeleine Sugar Estates, T. 2110 and T. 1429 are very promising canes, T. 1113 and T. 2009 are fairly good.

Forres Park, with the exception of T. 1113 all the varieties are growing well.

Caroni, all have made good growth.

Bronte, all are growing fairly well.

It is to be regretted that no information has been received from the Woodford Lodge or Trinidad Estates Limited.

A further lot of five new seedling varieties, *viz.*:—T. 1320, T. 1811, T. 1903, T. 2019 and T. 2020 were sent out in November, 1927, to five estates for trial, but results will not be obtained before 1930 crop.

Manurial Experiments.

Cacao.—The Manurial Experiments started in December, 1925, on cacao and coconuts on behalf of the British Sulphate of Ammonia Federation Limited have been continued and the results of the second crop recorded. The experiments on cacao are being carried out at River Estate (a) in Field 5, in three series :—

(1) On plots having the full amount of immortel shade trees, as is usually found on plantations.

(2) On plots from which 50 per cent. of the shade trees were removed during 1910.

(3) On plots from which all of the shade trees were removed during 1910.

These plots are about $\frac{1}{3}$ of an acre each; the trees are planted 15 feet by 15 feet and the individual yield, *i.e.*: the number of pods borne by each tree, have been recorded since 1910.

(b) In Field 20, on a manured plot of $2\frac{1}{4}$ acres with a control plot of 2·84 acres. All of the shade trees were cut out in 1910 and the cacao trees are 12 feet apart. The yields of individual trees in this field have not been kept but the yield of both plots has been recorded since 1910.

(c) At La Vega Estate, Brasso, on two whole fields of $5\frac{1}{2}$ acres each. The manured field "Nelson" has 1,486 cacao trees and the control "Philip" 1,513 trees or 270 trees to the acre. They are shaded with the usual amount of immortel trees. The crop record of these fields has been kept for the past 20 years.

A progress report to 31st December, 1927, on the above experiments has been prepared.

A new set of Manurial Experiments on cacao was started in June, 1927, at River Estate, with pen manure applied in three different ways and with Ammo-phos manure supplied by the American Cyanamid Company.

Coconuts.—The experiments on coconuts, on behalf of the British Sulphate of Ammonia Federation Limited are being made at Endeavour Estate, Chaguanas, on four whole fields, three of which have been manured and the fourth is kept as a control. The manured fields vary in size from 8·0 to 9·3 acres and the control field is 17·4 acres, containing from 79 to 85 trees to the acre. The crop record of these fields has been kept for five years previous to manuring, *i.e.*: from the time they came into bearing. A progress report to June 30th, 1927 has been prepared.

Citrus Fruits.—Small experiment plots were started in June, 1927, on citrus fruit at the St. Augustine Experiment Station with Ammo-phos supplied by the American Cyanamid Company.

MISCELLANEOUS.—Two samples of synthetic pen manure prepared by the "Adco" process were analysed and the results are given below. Sample "A" was tested two months after the heap had been made and "B" a month later.

	A.	B.
Water	80.16	77.38
Organic and Volatile matter	12.00	15.76
Mineral matter	7.84	6.86
	100.00	100.00
Containing :—	*Per cent.*	*Per cent.*
Lime (CaO)	0.70	1.10
Potassium oxide (K_2O)	0.11	0.26
Phosphoric anhydride (P_2O_5)	0.45	0.61
Nitrogen	0.27	0.51
do. calculated on dry matter ..	1.36	2.25

GOVERNMENT FARM—TRINIDAD.

The following report is by Captain H. V. M. Metivier, the Officer-in-Charge of the Farm.

Weather.

The rainfall was 85 inches compared with 57 inches in 1926. The driest month March had 1·22 inches, and March 1926 only ·13 inches. There was really no dry season, the rainfall for the first six months—our driest spell—was 36 inches. In spite of this extraordinary weather it was possible to carry out the work of the Farm without any supplemental vote, although the cost of reaping canes—the chief fodder plant in the dry months of the year—was high as well as the upkeep of the ratoons, which were very backward after reaping, and called for more expenditure in cultivating and weeding. The St. Joseph River was in flood frequently throughout the year, and as this river runs through the Farm cutting off approximately 100 acres, most of which is planted in fodder crops, this caused considerable inconvenience and expense. A request has again been made for the bridge which is so necessary.

Cattle.

The first batch of pure bred cattle ordered through the Canadian Agricultural Department following the visit of Mr. C. A. Archibald, Dominion Stock Promoter, to the Colony in 1925, arrived in May and amongst them were five Holstein calves (three heifers and two bulls) for the Farm. One of the bulls was nine months old, the other bull and the heifers were all six months of age. The average cost, landed in the Colony, was bulls $140 and heifers $120.

The second consignment of pure bred Canadian Cattle arrived in December when the Farm received two more yearling bulls of the same breed : their landed cost was $120 each. One of the heifers imported in May died from Piroplasmosis (Red Water Fever), but the others are all doing well. These new importations will greatly relieve the other pure bred bulls on the Farm, as with only two on service they were decidedly overworked.

The pure bred Holstein Bull "Royal Duke" again stood for service at Petit Morne, San Fernando, but was returned in June when "Mindi Homestead do Kol" was sent to take his place. The other pure bred bull "King Butter Girl Walker" stood for service at the Farm throughout the year. To these three pure bred bulls 176 cows and heifers were bred during the year and of these 131 were farm animals. The fee charged for privately owned animals was $3.60.

DAIRY HERD.—This herd produced 28,177 gallons of milk and of this amount 26,630 gallons were supplied to the Public Institutions.

The calves from the dairy herd were successfully hand-raised by using whole milk for the first six to eight weeks and then gradually substituting calf meal gruel together with increasing amounts of dry feed made up of equal parts of oats, bran and corn meal and one-quarter the amount of oilmeal.

The cows were all fed on the basis of 3½ lb. of concentrates per 10 lb. of milk. During this year a new record was attained when the grade Holstein cow "Prude" reached 60 lb. of milk per day, and 12,000 lb. in 12 months.

At the annual sale seven young grade Holstein bulls were sold at the average of $38. Eighteen grade heifers realised an average of $45 ; one grade Holstein heifer in calf $90.

Nine cows averaged $70. Fifteen cows were also sold to the butcher. Eleven cows fresh in milk or heavy in calf, were purchased locally to keep up the milk supply. During " Health Week " the Farm erected two model cow stalls at the Prince's Building and sent two dairy cows in order to give daily demonstrations on clean milk production. A fly-proof milk room was built in which the straining and the bottling of milk was carried out. At the same time an old type cow stall was constructed and a cow of non-dairying disposition and a suckling calf were stabled in it : this was done chiefly to demonstrate to the East Indians how very much cleaner it was to milk the cows without a calf, and that cows could be milked without a calf at foot. With the help of the Medical Department, large numbers of East Indians attended the demonstrations daily and a short lecture on clean milk production was given by Captain Metivier. The Town Clerk of Port-of-Spain, on behalf of the Health Week Committee wrote thanking the Farm.

Zebu Herd.—This herd with the imported Hissar Bull at the head was maintained independently of the dairy herd as in former years. The cows in milk are brought into the dairy and stall fed, but their calves are allowed to suckle them. The dry cows and heifers are brought in daily and given their concentrates.

The herd is very much admired by all visitors to the Farm and though the demand for these cattle on the Sugar Estates has fallen off in preference to the Water Buffalo, there is a big demand for them from the neighbouring islands.

At the annual sale a two-year old bull was sold to Cuba for $360 and a yearling to Barbados for $240 : another yearling bull was sold to Cuba for $240 and a heifer calf to St. Vincent for $80.

Bulls at Public Pastures, Out-Districts.—During the year the Farm sent out to out-districts eleven service Bulls, including one pure bred Holstein Bull and one pure bred Red Poll Bull. Five of these bulls were in the Port-of-Spain district, three at San Fernando, one at St. Augustine, one at Arima and one at Diego Martin. The Revenue for hire of these bulls was $550, and it is included under Stud Fees.

Health.—It is very pleasing to report that the quarantine restrictions carried out in controlling contagious abortion have given most satisfactory results and that during the year only five cows aborted whereas 75 calved normally. The result of contagious abortion has been felt in other directions however as a few cows proved barren and others were constantly in oestrum. This was a great handicap to the already overworked breeding bulls, but with the four newly imported bulls it is hoped that more calves will be produced.

From other diseases and injuries the total losses were twelve. Five calves died from acute digestive troubles, three young animals from internal parasites, one imported Holstein heifer from Red Water Fever, one cow from peritonitis due to an injury and another from septicaemia due to a broken horn that suppurated ; an old ox was destroyed.

Horsekind.

During the visit to the Colony of the Acting Director of Agriculture of British Guiana in January an exchange was arranged, between the stallion " Nelsweep " which was returned from Tobago early in the year and " Waterbass." The latter was used chiefly in Tobago.

The new stallion " Golden Eaglet " stood for service at the Farm and at Woodford Lodge Estate, Chaguanas and thirty mares were sent to him. The service fee for his first year was fixed at $20. The old stallion " Marat " was destroyed during the year. The four yearling fillies by this stallion that were offered at the annual sale were sold for $315, approximately $80 each ; the highest price realised was $146 for the filly out of the mare " Cavel " (dam of " High Jinks " and " Mistinguette"). During the year two colts were borne by Farm

mares, one is by " Marat " and a Tobago mare ; and the other out of the James Reddich mare " Nellie " is a full brother to the winners " Red Fox " and " Quicklight " The " Anchor " Cup offered at the Christmas Races was again won by an animal " Nell Gwyne " sired by a Government Stallion. This time the stallion was "Nelsweep " and the prize of £30 offered for the breeder of the winner goes to Tobago where this animal was bred. The Donkey Stallions both stood for service at the Farm throughout the year. The Kentucky Jack Donkey " Emperor " was bred to thirty-two mares. His service fee was $7.50. The smaller Jack Donkey " Barbados Joe " developed fistulous withers and had to to operated on three occasions during the year, but in spite of this, it was still possible for him to serve sixteen jennies and two mares. (Service fee $1 for donkeys and $5 for mares.)

The brood mare " Dolly " gave birth to a nice mule foal by " Emperor " during the year, and this young mule will be offered at the next annual sale.

Pigs.

There were no importations this year. There is not a great demand for the " Blue Hog " so it has been decided to rear only two breeds of pure bred pigs at the Farms, both in Trinidad and Tobago, namely large Blacks and Berkshires.

Forty young pigs were sold at the Annual Sale for $620 and another twenty-five privately for $215. Some went to the Agricultural Departments of Barbados and British Guiana. The Berkshire Boar " Berkely " imported from Barbados died from pneumonia, and a Blue Hog sow from general debility. The number of outside services was forty-five, an increase of twenty-six on 1926, the fee for service was $1.50.

Dairy Goats.

It was impossible to offer any goats at the annual sale as there was a high death rate in the young stock born during 1926. This year the goats have done very much better, eight were born and only two died. They are now turned out to graze every morning. The kids are very much stronger and healthier. The only sale was a young buck to the Chacachacare Settlement for $25. An order was received from Jamaica for a pure bred Saanen Buck for $100, and this order could have been executed but for the restrictions in force in Jamaica against stock imported from this island, although we are free from all form of contagious diseases.

The number of outside services this year was twenty-four at $2 each. Owing to privately owned Bucks, the number of services was much less than in 1924 and 1925, and there is not such a demand for young bucks to stand for service in out-districts.

There is a tendency for both " Roby " (buck imported from Switzerland) now stationed in Tobago, and " Madel " his son by the imported Swiss doe " Madel " to throw horned progeny. This is a decided defect and an attempt will be made to purchase a buck of the well-known " Baron Baldwin " strain, whose progeny are heavy milking goats and always hornless.

Poultry.

The amount realised in sales was $254 compared with $190 in 1926 and $134 in 1925. The number of eggs sold was 2,209 and the revenue was $175, about the same as in 1926.

Instead of feeding a mash containing oats and maize meal with oilmeal, pollard, &c., the oats and maize are fed separately and the hoppers are kept full of a mash composed of oilmeal, pollard and bran to which meat is added three times a week in the form of very finely minced liver or spleen. This method of feeding together with the addition of a meat ration increased the egg production towards the end of the year. The water given to the birds both young and old contains potassium permanganate in the strength of 1-6000 and which is an excellent preventative against contagious diseases.

The weather was unsatisfactory for the rearing of both ducklings and chickens.

Sale of Stock.

The Annual Sale took place on March 4th and was very well attended. It was conducted by the Officer in Charge and the Overseer, and the bidding was very brisk throughout. It is abundantly clear, from the number of animals purchased for shipment outside the Colony, that the stock bred at this Farm is appreciated throughout the West Indies. At the sale cattle were purchased for Barbados, St. Vincent, Martinique and Cuba, and pigs for Tobago, Demerara, Grenada, St. Vincent, St. Lucia, Martinique and Venezuela. The receipts were $3,650 an increase of $1,382 on 1926. The amount realised by private sales was $2,293.64 making the total amount for the year including arrears for 1926, $6,454.76.

Public Pastures and Stabling of Animals.

The pastures on the Farm were green throughout the " Dry " season owing to the heavy rains and the cattle in the public pastures kept in extremely good condition for the whole year. It was impossible to erect a reinforced concrete fencing on the eastern boundary of the larger public pasture owing to the weather and the continuous flooding of the river from which it was impossible to remove boulders, gravel and sand. The limes forming a hedge along this line of fencing was however cleaned and several new wooden posts erected to keep this part of the fencing in order.

The average number of cows pastured daily was seventy and two grade bulls (a grade Zebu and a grade Holstein) were allowed to remain with the cows and heifers throughout the year. A smaller pasture as in former years was reserved for a number of cows and heifers sent to be bred to the pure bred Holstein bulls : the average number of head in this pasture was thirty-five. Besides cattle the pastures accommodated daily about a dozen mares sent to be bred to the Jack Donkey Stallion. Ticks on these cattle were controlled by regular spraying during the same intervals as the Farm animals were sprayed. A good many mares were stabled at the Farm during the breeding season as " Golden Eaglet " stood, except for a short spell at Woodford Lodge Estate, for his services at the Farm. The result of this was that our revenue from this source was nearly $1,000. The total revenue for the pasturage and stabling of all animals on the Farm was £500, an increase of £170 on last year.

Fodder Plants.

There was a good supply of grass throughout the year and there was no necessity to supply the Constabulary with Uba cane or Cane tops. The revenue from the sale of fodder was £550 ; £100 less than last year, but owing to the abundant growth of fodder, £90 was obtained from the sale of Uba canes which could have been used for fodder if there had been a dry season. Further by selling to the City Council grass at 8 cents per 100 lb. which they had to cut and cart away instead of 24 cents, when cut and carted by the Farm, made the revenue a little less, though the actual amount of grass supplied was greater but at the same time the expenditure was reduced.

Uba Canes.—With seventeen and a half acres of the Farm in Uba cane, it was decided not to extend the fodder crop. These canes did not suffer from froghopper blight and all the fields gave excellent returns. Owing to the exceptional weather only 4½ acres were cut for fodder. Six acres sold for sugar making. Owing to the extremely wet weather and the expense of reaping the Uba together with the fact that the canes were sold on a sucrose basis, it was decided to allow seven acres of Uba cane to stand over. All the fields that were cut were forked and in spite of the weather the ratoons have done very well with the exception of about two acres in which " corn " grass seemed to be getting an upper hand towards the end of the year. This plot was cut down and fed at once to the stock as the mixture was an excellent one for the dairying cattle. At the end of the year this was the only area used up for fodder purposes.

Sugar Cane.—The estimate made in the last report of a yield of over 40 tons per acre this year from canes was reached, 1,700 tons were delivered to Orange Grove Factory from 35 acres or over 48 tons per acre. The canes were sold on a sucrose basis for the first time, and as it was such a wet year, the price obtained was much lower than that paid the ordinary farmers. The basis of payment was the value of 96 per cent. Sugar (f.o.b.) to the extent of 5½ per cent. of the weight of the canes delivered at the factory provided the juice yielded 1·5 lb. of sugar per gallon. The juice averaged 1·2 lb. and the price received was $2.92 per ton of cane compared with $3.45 received by small farmers under the ordinary sliding scale. In spite of the low price however the revenue from this source was £1,050, just £30 less than last year when the price paid per ton was 50 cents more.

The total revenue from the sale of canes, including Uba and cane plants was £1,265, which was an excellent return as 350 tons of fodder and four gallons of molasses per ton of cane were also obtained.

There was a slight attack of froghopper blight on the 5-acre plot planted in B.H. 10 (12), B.A. 6032 and B. 156; Cyanogas was used with fair success. This area yielded per acre as plant canes 43 tons as 1st ratoons, 41 tons as 2nd ratoons with manure 49 tons per acre.

Sweet Potato Vines.—The vines from the eleven acres planted last year, were reaped and fed to the dairy cows and the return was nearly double the amount per acre last year.

"Java Unknown" Cane.—The small area planted with fodder crop was not reaped this year but allowed to stand over. It yields less trash than Uba and the cane seems to be softer. At the same time it is quite hardy and can be treated in the same way as Uba. Should it ratoon satisfactorily, it will be advisable to cultivate this cane as a fodder crop in place of Uba.

Elephant Grass.—This grass (*Pennisetum purpureum*) was again planted on a ploughed 5-acre plot. At the same time the grass is being well distributed over the Farm in the manure spread on the grass fields. The yield of fodder per acre is considerably increased wherever this grass plant is growing and dairy cattle are very fond of a mixture of Elephant and Para grasses.

Miscellaneous.

Coconut Plantation.—The two plots along the north bank of the River and south of the Farm buildings were well manured and the younger cultivation was supplied. In the area adjoining the Recreation ground the trees suffered from the heavy rains and the main drains had to be opened up. A dozen trees were lost but since the draining work there has been a great improvement and several of the trees are now in full bearing. This area was also supplied. The Revenue from the sale of nuts was $173.83.

Drying and Milling Plant.—The second hand boiler purchased at the end of 1926 was only erected in March and owing to boiler trouble throughout the year, very little work was done in the factory, the boiler going from bad to worse and had to be taken down to be retubed at the end of the year.

Buildings.—The Public Works Department repaired and extended the Overseer's quarters adding a bed room and installing sewerage.

The expenditure by that Department was as follows:—

Overseer's Quarters	....£175
Water Rates	....£102

Instruction.

The Farm was again visited by the First and Second Year Diploma Students of the Imperial College of Tropical Agriculture for practical demonstrations in their veterinary and animal husbandry classes.

Revenue.

	£	s.	d.
Sale of Stock	1,344	14	10
Sale of Canes	1,264	17	4½
Sale of Milk and Eggs	3,340	12	3
Stud Fees	364	13	9
Pasturage and Stabling	508	4	6½
Grass and Coconuts	645	11	4
	£7,468	14	1

Expenditure.

	£	s.	d.
Personal Emoluments	419	3	4
Wages of Extra Employees	2,512	19	1
Wages Trinidad Govt. Rly.	25	0	0
Travelling Manager	4	16	7
Motor Lorry	324	13	5
Miscellaneous	10	19	7
Materials	329	18	7½
Feed for stock	1,419	18	8
Purchase of Stock	379	13	9
Expenses of Stallions	149	18	4
	£5,577	1	4½

GOVERNMENT FARM—TOBAGO.

The stallions "Quickmatch" and "Waterbass" stood for service at the Farm during the year. The greatest demand was for the Kentucky Jack "President." There was a slight increase in fees for the boars, but a falling off from the bulls and goats.

A statement of revenue and expenditure is appended.

Receipts.

	£	s.	d.
Sale of Stock	5	7	8
Sale of Poultry and Eggs	12	2	3
Sale of Grass and Wood	25	0	9
Sale of Coconuts	96	10	0
Medicines and miscellaneous	1	0	4½
Pasturage fees	28	5	0
Stabling of mares	3	6	4½
Service Fees—Quickmatch	23	8	9
Do. Waterbass	3	2	6
Do. President	34	7	6
Do. Foch	1	0	0
Do. Bulls	1	5	0
Do. Boars	7	3	9
Do. Buck	2	0	0
Do. Ram	0	12	0
	£244	11	11

Expenditure.

	£	s.	d.
Salaries	160	5	0
Labour	309	10	9½
Materials	24	2	11½
Clearing Pasture and Fencing	20	0	0
Telephone Rent	2	10	0
Feed Stock	99	12	1½
Travelling	11	5	0
	£627	5	10½

VETERINARY DIVISION.

GENERAL.—Captain H. V. M. Metivier, Government Veterinary Surgeon, returned from leave on January 19th. Whilst in England, he spent eight weeks at the Institute of Animal Pathology, Cambridge, working chiefly on three diseases, (1) Tuberculosis, (2) Ulcerative Lymphangitis, (3) Contagious Abortion in Cattle.

Animal Husbandry (Dairying, &c.)

It is very pleasing to record the progress made during this year in the improvement of dairy cattle in the Colony. Through the valued help of the Canadian Department of Agriculture, two consignments of a total of 65 pure bred cattle were received from Canada for estates and the Government Farm. This Department has had excellent results with Holstein (Friesian) cattle, 55 of the imported animals were of this breed, the others being mostly Ayrshires. Further orders were placed for 1928. Another important event is that the Ste. Madeleine Sugar Company Limited started a commercial dairy to supply milk to San Fernnado: Waterloo Estate is preparing to carry out a similar scheme, and Messrs Alston Limited have purchased two small dairies to form a nucleus of a large dairy farm for supplying milk to Port-of-Spain. On some of the sugar plantations steps have been taken to keep a small herd of dairy cows for supplying milk to the staff and to stop the practice of getting this milk from the cattle maintained for breeding working oxen: at their best these Grade Zebu cows give very little milk, just enough to rear a calf, and when some of this was used, the results due to the high death rate in suckling calves, were most disheartening. This new plan will provide cleaner milk for consumption and a better class of working stock for the estates.

The year was extremely wet and there was an abundant supply of fodder for stock even through the drier months due also to the excellent results obtained by planting fields of Elephant Grass (*Pennisetum purpureum*) and Uba canes for fodder, as previously recommended by the Department.

Proclaimed Diseases.

ANTHRAX.—One case occurred at Rio Claro on a Cane Farmer's holding. The in-contact stock were all vaccinated and the pens disinfected. There were three cases at the Detention Station in cattle imported from Venezuela.

GLANDERS AND EPIZOOTIC LYMPHANGITIS. No cases occurred.

SWINE FEVER.—No cases occurred.

RABIES.—The regulations governing the importation of dogs remained in force and the arrangements made for allowing dogs from Great Britain and Northern Ireland to be landed without quarantine restrictions, provided they are accompanied with certificates from the Ministry of Agriculture and Fisheries, worked extremely well. The Ministry provided the Certificates free of charge and gave considerable assistance to all importers of dogs.

TUBERCULOSIS.—Tuberculosis was detected in the carcass of an ox from Exchange Estate, Couva, sold to a butcher. All the cattle, with the exception of the working oxen, were tested with tuberculin on Exchange and Waterloo Estates and 10 per cent. reacted. These were all slaughtered under the "Diseases of Animals Ordinance." Approximately 100 dairy cattle in the suburbs of Port-of-Spain, belonging to five small dairies, were tested at their owners' request at the expense of the Government by this Division. The number of reactions was ten, four being cattle imported from Barbados. The reactors were all slaughtered and compensation paid to their owners. The latter tests were carried out during the sittings of a Committee appointed by the Government at the end of 1926 to go into the question of Tuberculosis in Cattle. The members were (1) The Surgeon-General (Chairman), (2) Captain the Hon. A. A. Cipriani (Deputy-Mayor of Port-of-Spain), (3) The Medical Officer of Health (Port-of-Spain), (4) Mr. H. Gibbon (Dairy Farmer), (5) The Government Veterinary Surgeon.

It was found by the Committee that there was no provision in the Diseases of Animals Ordinance to give the Government Veterinary Surgeon authority to test cattle with tuberculin, unless the disease was detected otherwise (macroscopic lesions in a cow from such a dairy after slaughter). It was, therefore, recommended that steps should be taken to provide this authority and also power to require that all imported animals (except those for immediate slaughter) should be (*a*) from accredited herds or (*b*) should have a certificate to the effect that they had passed a tuberculin test by a Government Veterinary Officer before shipment. Failing these conditions the animals were to be tested on arrival at the importer's expense and reactors slaughtered without compensation.

FOOT AND MOUTH DISEASE.—Cloven Footed animals were only imported from countries free of this disease. This disease has never occurred in the Colony.

Non-Proclaimed Diseases.

CONTAGIOUS ABORTION IN CATTLE.—This disease is under control. The preventative methods outlined in former years have been carried out by owners with satisfactory results.

BOVINE PIROPLASMOSIS OR "RED WATER" FEVER.—Owing to the increase in the number of imported cattle from Canada several cases of "Red Water" Fever occurred in the animals. The death rate on the whole was very low and the losses in young stock much less than in the case of adults. Trypan Blue, injected intravenously, gave satisfactory results as a curative treatment.

ULCERATIVE LYMPHANGITIS.—A dead vaccine (*a*) chloroform killed, (*b*) heat killed made by the Government Veterinary Surgeon at Cambridge, was tried on a few early cases of the disease with good results. The disease is much less seen now-a-days and only a few cases could be treated with the vaccine.

STRANGLES AND INFLUENZA.—These diseases were chiefly seen in imported horses and mules shortly after their arrival. Mules from the U. S. A. suffered most.

BULBAR PARALYSIS IN PASTURED STOCK.—No cases occurred in the areas reported in former years, but two cases were seen at River Estate and the disease was also reported to be prevalent in cattle fed on cut fodder in the Diego Martin Valley. The Department asked owners to notify the Government Veterinary Surgeon of all such cases but no cases were reported so it is assumed that the condition was exaggerated.

GRANULAR DERMIC SORES IN DONKEYS.—This disease is still fairly common in peasants' donkeys in the Naparimas, but no attempt has been made to carry out the recommended course of treatment, hence the results.

TETANUS.—Fewer cases reported : wounds are treated, especially foot wounds, as soon as they occur and the chances of infection reduced.

PARASITIC GASTRITIS, BRONCHITIS, PNEUMONIA.—These diseases, especially in young cattle, were not of common occurrence, although there was such a heavy rainfall. This is due to the greater care given to young stock and the regular monthly copper sulphate treatment recommended by the Department.

General.

VETERINARY LECTURES.—During the year the Government Veterinary Surgeon gave a course of lectures to the 2nd Year Diploma Students of the Imperial College of Tropical Agriculture. This Officer also lectured daily to dairymen on Dairy Cattle during Health Week Exhibition.

LIVE STOCK SHOW.—An excellent Live Stock show was held at the Ste. Madeleine Sugar Company and the Government Veterinary Surgeon was a Judge in all classes.

STRAY DOGS.—The usual campaign of collecting stray dogs was carried out by the Constabulary toward the end of the year in Port-of-Spain, Tunapuna, Chaguanas and Couva and the dogs were destroyed by this Division.

T. S. P. C. A.

The work of this Society is most encouraging as the number of prosecutions is decreasing annually in spite of the keen way in which the Inspectors of the Society and the Constabulary carry out their duties. The Government Veterinary Surgeon gave evidence on behalf of the Society in six cases.

GOVERNMENT ANIMALS.—The mounted Constabulary at San Fernando has been disbanded and motor transport substituted. The Mule Transport Train of the Public Works Department at Arima has also been replaced by motor transport. The surplus animals were either transferred to other Departments or sold.

The Government Veterinary Surgeon visited Government animals at the following places during the year :—The Leper Settlement and the Government Lighthouse Chacachacare, Toco, Arima, Maracas, St. Ann's, St. James, Diego Martin, Brasso Caparo, Couva, San Fernando, St. Clair and Constabulary Headquarters, Port-of-Spain.

Importation of Animals.

The following animals were imported into the Colony and inspected : Horses 63, mules 412, donkeys 32, dogs 35, cattle 6,680, sheep 859, pigs 2,753, goats 2,240. In the above mentioned animals were included 65 head of dairy cattle from Canada, 18 dairy cows and heifers from Barbados, 2 buffaloes from British Guiana, 13 thoroughbred horses from England, two American and three Canadian saddle horses, 369 Kentucky mules and 31 dogs from England. The Revenue obtained for this work amounted to £1,176 0s. 0d.

PASTURES IN PORT-OF-SPAIN DISTRICT.

QUEEN'S PARK SAVANNAH.—It was definitely decided during the year by His Excellency the Governor not to allow cattle to return to the Queen's Park Savannah. The upkeep of this pasture was again costly as owing to the high rainfall, the growth of grass was heavy even in the "dry" months. This good growth, however, has killed out the "Sensitive Weed" on the Savannah, and all the bare patches due to attacks of mole crickets in former years were covered with grass.

A pair of mules, and a mowing machine were purchased and gave entire satisfaction. A supplemental vote was asked for to purchase two more similar machines but it was refused by the Finance Committee and we were advised to allow the grass to be cut and carted away free of cost, as being a cheaper method. There are two great drawbacks to such a scheme, which, however, had to be carried out. In the first place the pasture is badly cut up by the numerous donkey carts —as many as twenty on some days—that go there for fodder and secondly if all the grass is cut and carted away and nothing left as mulch in a short time the grass will get into very poor condition.

In the earlier months of the year, before the mowing machine was used, it was necessary to employ about 10 scythe-men daily, but this number was reduced to two and then to one towards the end of the year when the rainfall was heaviest : at this time we were also assisted by the grass cutters from outside.

ST. ANN'S AND MUCURAPO PASTURES.—Cattle were allowed to graze on the Mucurapo Pasture as well as on the St. Ann's Savannah during the year. In the former savannah the number of head per month averaged 70 and in the latter 42. The cattle kept in good condition throughout the year, and in the case of St. Ann's Savannah it was arranged for the cut fodder—two cart loads—to be sent for the stock there from the Queen's Park Savannah daily.

During the year grounds were allotted to twenty-six cricket clubs and ten football clubs on the Queen's Park Savannah : on the Mucurapo Pasture, besides the golf club, one cricket club had the use of a playing ground.

BULLS FOR SERVICE.—Several highly graded Holstein Bulls from the Government Farm were kept at the Mucurapo Stables for service. Two were used on the Pastures and the others stood at the Stables.

Revenue.

	£	s.	d.
Mucurapo Pasture	210	2	8½
Queen's Park Pasture	102	2	6½
	£312	5	3

Expenditure.

	£	s.	d.
Personal Emoluments ..	125	0	0
Gate Keepers	288	19	2
Wages (Labour)	491	10	4
Trees (Upkeep)	39	7	6
Materials	91	9	2
Feed for Stock	142	7	6
Hire of Bulls	50	0	0
Purchase of Stock	39	11	8
	£1,268	5	7

RIVER ESTATE.

The year was a very satisfactory one—the cacao crop being the best yet recorded. The amount of cacao reaped and delivered during the year was 1318·6 bags. (of 165 lb.) made up as follows :—204,782 lb. 1st grade cacao, 12,214 lb. black cacao, 580 lb. pasila. A high standard of 1st grade cacao was maintained throughout. All produce was disposed of through the Cacao Planters Association at an average price of $15.25 per fanega (110 lb.) for 1st grade.

The crops for the five years since 1923 have been :—1,250, 918, 1,169, 829, 1,318, an average of 1,097 bags. Indications for 1928 are very promising. The revenue was £6,216. 5s. 9d. and the expenditure £4,185. 3s. 7½d., leaving net profit on the year's working of £2,031. 2s. 1½d. The profit would have been

much greater but for the number of other crops, mostly young and as yet unproductive, which are being maintained and developed—these comprise :— citrus about 30 acres, mangoes about 10 acres, cotfee about 25 acres, limes about 20 acres, tonca beans about 10 acres, hydnocarpus and derries about 4 acres and timber about 400 acres.

The citrus crop during 1927 was a total failure throughout the Colony. Under ordinary circumstances the revenue from citrus should have been in the neighbourhood of £100.

The citrus and cacao nurseries have been developed considerably and there will be available by June next for planting out about 6,000 citrus and 10,000 cacao plants all carefully selected, well grown and disease free. With cacao the usual progressive programme was continued. Manuring and reduction of shade was given special attention. Particular care was given to the raising of nursery stock and "supplying." The benefit from planting out only well grown and vigorous plants, in well prepared and manured holes so that they make a good start, is very evident from the results obtained. Another large area (Field No. 8 about 8,000 trees) was brought under intensive cultivation and is already promising well. As the supply of manure plays such an important part in the successful operation of River Estate it was found necessary to augment this by an extension of the cattle pen. During the year ten new stalls were added and by arrangement with the Government Farm ten young grade heifers are maintained on loan at River Estate. To meet the requirements of this extra stock the grass fields have been extended and there are now about ten acres under fodder.

The large area under timber has not been materially extended, work being confined more to a policy of consolidation by linking up of various disconnected pieces. There is still much work to be done in this direction.

The rainfall during 1927 was 85·40 inches, the highest recorded at River Estate. There were several heavy floods during the year and a fair amount of damage was done along the river banks and various ravines. This abnormally heavy rainfall has not however been without its advantages chief among which was the elimination of bush fires and their attendant consequences also the revegetation to a considerable degree of arid hill lands and other areas affected by previous droughts and fires and finally the resuscitation of many streams, wells and other sources of water supply which had almost ceased to exist.

The Manager gave considerable time to the inspection of properties for the Agricultural Bank, visiting thirty-five properties in the following districts, Manzanilla, Sangre Grande, Tamana, Toco, heights of Arima and Aripo, Caura, Moruga, Erin and Siparia.

Visitors to the Estate were numerous during the year. While there is a healthy sign of appreciative interest taken by the planting community in the activities of River Estate it imposes a heavy strain on the time and duties of the staff.

Tables showing total revenue and expenditure, and abstract of the expenditure and field yields are appended :—

Revenue and Expenditure, 1927.

Revenue.	£	s.	d.
Sale of Cacao	6,108	8	10
Rent	5	1	8
Miscellaneous	85	0	0½
Pasture fees	17	15	2½
	£6,216	5	9

Expenditure.	*Amount.* £	s.	d.
Personal Emoluments ..	609	0	0
Wages of Assistants	428	8	10
Labour	2,394	14	7½
Travelling and Transport ..	249	2	8
Contingencies	65	16	5
Miscellaneous Improvements ..	190	2	5
Materials	124	1	4
Stock	123	17	4
	£4,185	3	7½

RIVER ESTATE.

Abstract of Expenditure, 1927.

Heads.	*Details.*	$ c.	*Amount.* $ c.
Staff.			
	Manager	1,680 00	
	Overseer, Drivers and Watchman	2,707 92	
	Travelling, Messenger, &c.	379 46	4,767 38
Maintenance.			
	Roads, Bridges and Hedges	350 70	
	Water service and River	20 75	
	Repairs to Buildings	412 99	
	Supplies, Tools, Bags, &c.	431 63	
	Yard	306 44	
	Pasture	28 91	
	Destruction of Vermin	105 37	
	Sundries including visitors	389 66	
	Nurseries	272 13	2,318 58
Transport and Stock.			
	Labour	643 05	
	Materials	745 30	
	Produce—Lorry	1,206 56	2,594 91
Non-Recurrent.			
	Purchase of Cacao Contract	43 92	43 92
Cacao Cultivation.			
	Draining	76 58	
	Cutlassing and Weeding	1,433 25	
	Pruning	1,107 64	
	Supplying	337 64	
	Tillage	116 58	
	Manuring	1,493 00	
	Plant Sanitation	348 68	
	Shade Control	342 42	5,255 79
Cacao Manufacture.			
	Reaping	1,969 08	
	Curing and Bagging	595 27	2,564 35
Fruit.			
	Maintenance	1 41	
	Cultivation	702 04	
	Reaping	11 63	715 08
Coffee.			
	Cultivation	146 90	
	Reaping and curing	17 38	164 28
Limes.			
	Cultivation	144 07	
	Reaping	3 00	147 07
Tonca Beans.			
	Cultivation	80 25	
	Reaping	1 20	81 45
Timber.			
	Purchase of Contracts	217 28	
	Cultivation	383 72	601 00
Experimental Work.			
	Superintendent's House Allowance	600 00	
	Supervision	50 00	
	Labour	161 06	
	Material	24 00	835 06
		$ 20,088 87	$20,088 87

RIVER ESTATE.

Annual Yield per acre for each Field of Cacao, 1923 to 1927.

No. of Field.	No. of Bearing trees.	Half trees.	Quarter trees.	Supply trees	Missing trees.	Total.	Age of trees.	Planting distance.	Acreage.	Yield. 1923. No. of Bags of 165 lb.	1923. No. of Bags per Acre.	1924. No. of Bags of 165 lb.	1924. No. of Bags per Acre.	1925. No. of Bags of 165 lb.	1925. No. of Bags per Acre.	1926. No. of Bags of 165 lb.	1926. No. of Bags per Acre.	1927. No. of Bags of 165 lb.	1927. No. of Bags per Acre.
1	4,862	283	645	649	74	6,513	20-26	12 x 12	21.7	53.33	2.4	37.33	1.7	44.00	2.0	27.33	1.2	54.66	2.5
2	2,020	126	549	1,345	83	4,123	50-56	15 x 15	21.7	44.72	2.0	30.66	1.4	48.00	2.2	31.33	1.4	46.66	.1
3A	1,499	182	272	677	30	2,660	50-56	15 x 15	14.0	40.00	2.8	25.33	1.8	38.66	2.7	28.00	2.0	41.33	2.9
3B	1,383	221	339	280	7	2,230	50-56	15 x 15	11.7	30.66	2.6	21.33	1.8	30.66	2.6	19.33	1.6	32.00	2.7
4	5,141	257	430	62	1,128	7,018	40-51	12 x 12	23.3	47.33	2.0	48.33	2.0	56.00	2.4	32.66	1.4	45 33	1.9
5	2,082	170	343	334	13	2,942	50-56	15 x 15	15.4	68.67	4.4	50.33	3.2	60.66	3.9	43.33	2.8	67.33	4.3
6	5,452	337	436	769	46	7,040	20-26	12 x 12	23.4	102.66	4.3	61.33	2.6	92.66	3.9	52.00	2.2	97.33	4.1
7	3,447	477	545	422	56	4,947	20-26	12 x 12	16.4	61.33	3.7	44.00	2.6	60.66	3.7	35.33	2.1	73.33	4.4
8	5,275	910	1,094	182	684	8,145	20-26	12 x 12	27.1	84.00	3.1	51.33	1.8	69.33	2.5	54.66	2.0	101.33	3.7
9	4,327	866	1,044	1,231	60	7,528	20-26	12 x 12	25.0	66.66	2.6	53.33	2.1	48.66	1.9	46.00	1.8	73 33	2.9
10	3,016	414	905	536	119	4,990	20-26	12 x 12	16.6	32.66	1.9	22.66	1.3	21.33	1.2	22.00	1.3	33.33	2.0
11	2,070	161	510	398	63	3,202	20-26	12 x 12	10.6	20.66	1.9	14.66	1.3	16.00	1.5	13.33	1.2	20.00	1.8
12	3,130	621	1,399	89	1,113	6,352	20-31	12 x 12	21.1	31.33	1.4	21.33	1.0	23.33	1.1	16.66	.7	32.00	1.5
13	3,438	279	740	72	758	5,287	20-31	12 x 12	17.6	59.33	3.3	44.00	2.5	64.00	3.6	46.66	2.6	66.66	3.7
14	989	293	425	..	400	2,107	50-56	12 x 12	7.0	11.33	1.6	6.66	.9	6.66	.9	6.66	.9	10.00	1.4
15	1,810	225	334	..	292	2,661	50-56	12 x 12	8.8	9.33	1.0	6.00	.6	6.66	.7	5.33	.6	8.00	.9
16	3,457	346	987	32	954	5,776	20-51	12 x 12	19.2	24.33	1.2	16.00	.8	24.66	1.2	20.00	1.0	30.00	1.5
17	4,557	597	1,269	153	657	7,233	20-26	12 x 12	24.1	59.33	2.4	38.00	1.5	44.00	1.8	21.33	.8	46.66	1.9
18	3,038	628	938	84	565	5,253	15-26	12 x 12	17.5	42.33	2.4	37.33	2.1	32.66	1.8	33.33	1.9	52 00	2.9
19	4,056	369	380	220	68	5,093	15-26	12 x 12	16.9	50.66	2.9	49.33	2.9	48.66	2.8	35.33	2.0	65.33	3.8
20	5,167	332	331	395	26	6,251	15-26	12 x 12	20.8	84.66	4.0	58.00	2.7	72.00	3.4	50.00	2.4	74.66	3.5
21	3,561	264	295	584	239	4,943	15-26	12 x 12	16.4	54.18	3.3	45.33	2.7	60.66	3.7	38.66	2.3	53.33	3.2
22	5,184	1,231	1,276	48	758	8,497	15-26	12 x 12	28.3	72.66	2.5	54.66	1.9	92.00	3.2	61.33	2.1	76.66	2.7
23	3,227	554	767	30	322	4,900	15-26	12 x 12	16.3	49.33	3.0	38.28	2.3	59.33	3.5	46.66	2.8	62.00	3.8
24	1,696	612	1,457	287	636	4,688	15-26	12 x 12	15.6	19.33	1.2	20.66	1.3	24.00	1.5	15.33	.9	16.66	1.0
25	2,027	506	366	190	236	3,325	8-21	12 x 12	11.0	29.33	2.6	22.00	2.0	24.00	2.1	26.66	2.4	38.66	3.5
Totals	85,911	11,261	18,076	9,069	9,387	133,704	..	..	466.5	1,250.15	..	918.26	..	1,169.24	..	829.24	..	1,318.58	..
Total Average Yield per acre	..	..	..	..	..	..	..	..	..	..	2.6	..	1.9	..	2.5	..	1.8		2.8

PLANT PATHOLOGY.

Mr. F. Stell, Mycologist has furnished the following report on plant diseases during 1927 :—

The year was very wet. Not for a generation was the rainfall so heavy. In normal years there is a dry season from January to May, but during 1927 there was practically no dry season. This condition had its reactions on the crops. Some, such as sugar cane and cacao (in some areas) benefited. The continuous heavy rains had the effect of reducing the incidence of froghopper "blight," and in the normally drier areas the cacao trees recovered appreciably from the effects of the previous year's drought.

Sugar Cane.

An extension of the acreage under cane continues ; in general it is the poorer and more unproductive cacao properties which are converted to sugar cane, these are usually in proximity to the big factories.

Mosaic.—This virus disease still persists. It is in the northern sugar can, belt where the incidence is highest ; and it is amongst the cane farmers in thie area where most of the trouble is encountered. For some years now an educational campaign has been in operation and most of the growers appreciate the position and co-operate with the inspectors in the work of eradication. The fact that foliage infection of plant canes does not markedly damage the resulting crops makes it difficult for the cane-farmer to realize the potential menace of the affection. It is only when losses are sudden and severe that the average planter appreciates the significance of pests and diseases.

Another new centre of mosaic infestation has occurred this year in the cane farming district of Couva. To cope with this outbreak it has been necessary to employ an additional assistant and it is gratifying to record that the affected farmers are co-operating in control work. The incidence of this affection on the sugar estates is low, and one would strongly urge proprietors and managers to exercise the strictest supervision in rogueing the fields, the canes of which are to be used for planting purposes. Such a system would definitely help to stamp out this insidious disease.

Minor Diseases.—The leaf-spotting fungi, *Leptosphæria Sacchari* (ring spot) and *Helminthosporium Sacchari* (eye spot) have been fairly prevalent on some varieties of cane. They cannot, however, be said to have assumed economic importance.

Cacao.

The stock affections of this staple have been evident to an average extent during the year. Root disease, caused by *Rosellinia* sp. and *Sphaerostilbe* sp. appear most in evidence in densely shaded valleys, chiefly in the northern range. Control measures consist in isolating the affected trees by trenches and where this is effectively done the disease is delimited. It is unfortunate that these root troubles often occur amongst some of the most productive trees, the productiveness being due to the substantial amount of organic matter present in such areas. The above parasites live in such soils ; hence the need for prompt action when the cause of the trouble is accurately diagnosed.

Black Pod and canker disease caused by *Phytophthora* sp. are still too much in evidence. Excessive moisture favours these affections, and planters should carefully study their estates from a broad agricultural view point in an endeavour to make adjustments to minimize the incidence of these troubles.

During the year posters and hand bills were prepared for the guidance of planters in dealing with Black pod.

In addition to the usual affections of this crop, there was more thread-blight (*Corticium* sp.) present. This is accounted for by the prevailing wetness. Thread-blight is a minor disease of cacao. The most effective method of treatment is to reduce humidity by reducing shade. It is only in excessively moist and shaded localities that one encounters thread-blight to an extent where it can be said to have economic significance.

Coconuts.

As contrasted with the previous year, the wet weather, in most areas promoted the growth of this crop. This was specially noticeable on estates where the drainage is good and where a reasonable amount of cultural work is prosecuted. A concomitant feature of the additional moisture was a marked increase in the number of select nuts as compared with the previous year. It is pleasing to record that several of the larger properties, both in Trinidad and Tobago, have been doing a substantial amount of cultural work during the year. One cannot expect immediate results from such operations, but doubtless the trees will eventually benefit materially.

Red Ring.—This disease which is caused by the nematode (*Aphelenchus cocophilus*) has not nearly the high incidence which obtained a few years ago. But there are still considerable areas of young, non-bearing trees; also trees in the young bearing stage. It is trees in these groups which require careful watching. Red Ring is very infectious and devastating, especially where the early cases receive no attention. Where prompt action is taken when an infested tree is present, then there is abundant evidence that losses are few; in other words, red-ring can be controlled. The most important and immediate measure to take for arresting the spread of the affection is to isolate the affected tree by trenching. Such trenches should be sufficiently deep to sever the roots. Also if the leaves of the affected tree are interlaced with those of its neighbours, such leaves should be severed. Where the incidence of the affection is single scattered trees, the sites of such trees should be left unplanted for at least twelve months; better still, knowing that most coconuts are much too closely planted, it will probably be preferable not to replant where only a single tree is attacked. By this method it will no doubt be found that the remaining trees make better growth with consequent increase in crop which will compensate for the loss.

Little-leaf.—The incidence of this affection is, on the whole, low. In some districts it is practically absent; in others, it is fairly conspicuous. Planters generally are familiar with the trouble. It is one which can be cured, especially if dealt with in the early stages. No organism causative of the affection has been found. The symptoms, a progressive reduction in the size of leaves, &c., suggest mal-growth and possibly some amount of root deterioration. Affected trees should be dosed liberally in the crowns—after the strainers have been cut—with a dilute disinfectant such as milk of lime or Jeye's fluid. Sometimes it is admittedly difficult to detect the onset of this trouble in that the affected tissues are obscured by the surrounding healthy leaves of the same tree.

Wilt.—An affection, to which this descriptive name is given, occurs in a number of localities. It is typically found in heavy clay soils. In some instances, one can ascribe the cause to a high water table with consequent root decay and death. In other cases, it would appear that (1) the texture of some soils is unsuitable for root development as the tree ages; (2) some sub-soils are deleterious to root development. To-date, no organism has been isolated which can be said to cause this affection. This being so, one feels that the affection should be viewed from the standpoint of a debility trouble and treated accordingly. On general grounds one knows that the coconut requires a friable soil for normal root development. All authorities are agreed on that point. In so far as clay soils do not conform to this requirement, one can conclude (*a*) that proper aeration is largely inhibited; (*b*) that the living organisms of the soil are materially handicapped; (*c*) that (*a*) and (*b*) above vitally affect fertility.

Bud-rot, Bleeding-stem and Lightning with their attendant damage, were present to only a moderate extent. An interesting phenomenon was the presence of thread-blight on the leaves of a tree in a wet district; this was of minor importance.

Leaf Bitten Disease.—Recently there occurred on the North Coast an outbreak of this affection. The Colony records show no previous mention of a disease of this nature. A similar affection was recorded by Ashby in Jamaica several years ago. The cause of the disease is *Phytophthora* sp. the parasite

responsible for the Bud-rot in India, &c. In this instance, the planter reported that a considerable number of trees had died in recent months. On making a visit to the property, it was found that some of the crowns of the trees were in an advanced stage of collapse. A couple of trees in earlier stages of failure showed the leaves with broken midribs and yellowish-brown spots running across the leaflets, making a definite pattern. The location of this estate is in a fairly wet district and beetles are common. Presumably some amount of specific bud-rot is present in the district and wind and beetles are the agents responsible for distributing the affection. It is very necessary that whenever the bud tissues of a tree are decayed that the tree be felled promptly and all the crown tissues thoroughly destroyed by fire. To do this, the bud requires to be split in several pieces. Implements used in this process should be sterilized by fire before being used again. It is possible that by surgical treatment, trees affected by leaf-bitten disease may eventually recover. Such treatment must be instituted early, after a test has been made to determine whether or not the bud tissues are intact.

Coffee.

Extension work in the planting of this crop continues. The varieties most favoured are Arabica, Robusta and Excelsa.

Thread-blight, caused by the fungus *Pellicularia Koleroga* has been conspicuous, particularly in wet and excessively shaded areas. In normal years this affection is a minor disease. The chief feature of the affection is that the under sides of the leaves are covered with whitish branching fungus strands: later these strands assume a brownish colour. These growths are connected with thicker strands which adhere to the associated twigs. In typical cases of infestation, one sees numerous dead leaves suspended on the twigs by the fungus threads. It is probable that spraying would help to control this damage, but such a method should only be supplementary. What is of primary importance is to make adjustments in spacing and shade requirements. In many places the bushes are too closely planted and excessively shaded. The result is extreme humidity with consequent liability to thread-blight.

The parasite *Sclerotium Coffeicolum*, attacks the leaves and berries of Excelsa coffee, which is a member of the Liberian group. In areas with a normally high rainfall, the planting of Excelsa coffee should be discontinued owing to the virulent nature of this fungus in such districts. In other districts where Excelsa is established, and where this disease is present it may be necessary to spray the bushes with Bordeaux mixture to which a "sticker" has been added.

In the northern section of the Island, Arabian coffee is affected with the fungus, *Omphalia flavida*. Dense spotting of the foliage is characteristic of the disease. As control measures, one should aim at promoting drier conditions so as to give better access to light and air. Moreover, coffee bushes generally, of all varieties, require considerable periodical attention in cleaning and pruning. In this way not only will the health of the bushes be materially improved, but their cropping capacity will be increased.

Miscellaneous.

LIMES.—As compared with the previous year, the incidence of wither-tip (*Gloeosporium limetticolum*) was exceptionally high. The result was a very poor crop.

HIBISCUS SP.—This ornamental plant is subject to nematode infestation in several places in Port-of-Spain area. It is a root affection and house-holders are recommended to plant other ornamentals where this trouble is present.

SUN HEMP, MAURITIUS BEAN.—The older leaves of these recently introduced cover crops are subject to attack by *Cercospora* sp. in the plots at St. Clair. This fungus is not likely to be of economic importance.

Tobago was visited and the Annual Meetings of Agricultural Credit Societies attended.

Numerous visits were made to estates (large and small) and advice given on diseases and their control.

Many specimens of diseased plants were received at the office for diagnosis and methods of treatment.

Importations.

The following consignments were dealt with during the year :—

	No.
Seeds and Plants	595
Bags	424
Consignments destroyed	7
Consignments disinfected	1
Total Consignments	1,027

Other Pests.

PARASOL ANTS.—741 parasol ants nests were destroyed mostly by the Agricultural Advisers. Particulars are given below :

District.	*No.*	*Area. Square Feet.*	*Carbon bisulphide used. Ounces.*
St. George	149	263,802	5,375
Caroni	98	168,825	4,202
Nariva-Mayaro	71	86,216	1,866
St. Andrew-St. David	74	156,005	3,404
St. Patrick	144	158,699	4,318
Victoria	58	77,900	2,034
Tobago	103	121,572	2,890
Port-of-Spain	44	—	—

During the year 23 orders for the destruction of nests were served ; 18 on private owners and five on public bodies.

CACAO BEETLE.—This pest did much damage during 1926 due largely to the abnormal drought coupled with neglect following on the depressed period of cacao to which attention has frequently been drawn in the past. A temporary staff was appointed, Mr. J. R. Foster as Supervising Officer, with a staff of 12 Assistant Inspectors ; to each of the latter a district was assigned. The task is largely that of getting owners to pay more attention to the regulation of shade, particularly minor shade, as the beetle is most prevalent in cacao which is too much exposed to the sun. Catching the larvae (worms) and adults is important, but for permanent improvement, conditions have to be made which are not to the liking of the beetle. A great deal of very useful work has been accomplished and combined with a wet year the destruction wrought by the insect has been much reduced.

MONGOOSE CAMPAIGN.—The payment of sixpence for each carcase brought to receiving stations (usually Constabulary Stations and Sugar Estates) was agreed upon in order to reduce the numbers of this animal which in many districts is particularly troublesome, preying on poultry, &c. Between April and December 28,872 carcases had been paid for.

FROGHOPPER INVESTIGATION.—The special Committee of representatives of the Sugar Industry, Agricultural and Commercial Bodies, the Imperial College of Tropical Agriculture, with the Director of Agriculture as Chairman, has actively continued its work, which has been fully reported in its *Minutes and Proceedings* and published separately.

The previously known relationship between blight and unfavourable soils has been worked out in great detail, and it is now well established that lime deficiency is a determining factor.

Cyanogas has been used with success for killing the pest in the nymphal stage and should prove of great value in reducing the first brood and thus minimising the latter attacks.

The wet season was fortunately unfavourable to this pest, and the damage done was slight.

AGRICULTURAL EDUCATION.

Agricultural Advisers' Work.

There are seven Agricultural Advisers, who have as their districts one (or two) counties each. Their primary duty is to give practical assistance to all classes of cultivators, but principally the peasantry. They are local officers for Plant Protection work, also visit school gardens and give advice to the teachers, and make inspections for the Government Agricultural Bank. The Tobago Adviser is also the Central Accountant for the ten Agricultural Credit Societies in that island.

The following summary from their detailed reports affords information on work done.

County of St. George.

VISITS.—Total 1,000, including Mosaic disease eradication 425, cacao beetle control 149, parasol ants 149, bird vine and love vine suppression 88, coconut disease 21, school gardens 52, Agricultural Bank properties 30, general 86. Mileage travelled on duty 4,470.

CROPS.—The cacao crop was better than in 1926, the increase being mainly from drier localities and the better drained properties. Attention to improved methods was more marked than in any previous year. Black Pod disease appeared later than usual and the heavy rains were apparently not favourable to its spread. The coffee crop was very poor, due doubtless to the abnormally high rainfall. The growth of canes was good, but heavy rains during the crop season caused some to be left uncut. Coconuts on the other hand profited by the unusual season. Oranges and Mangoes did badly, and the rice crop was also poor.

DISEASES AND PESTS.—Sugar cane Mosaic was mild in intensity and the area infected did not increase. Cacao beetle were less prevalent. Much time had, as hitherto, to be given to parasol ants, bird vine and love vine. Thread blight of coffee has become a menace in certain districts, also Leaf spot disease in humid areas of the Caura Valley.

GENERAL.—The same schools as hitherto maintained their superiority in school garden work and reached a very high standard. Twenty-six estates were inspected for the Agricultural Bank.

County of Caroni.

VISITS.—762 visits were paid, entailing travelling of 4,434 miles.

CROPS.—Cacao was better than usual, due mainly to more favourable climatic conditions than to improved cultivations. Coffee was very poor, as also limes, due to wither-tip disease.

DISEASES AND PESTS.—Cacao beetles were less numerous, due to weather conditions and more general adoption of control measures by planters both large and small. The plantain weevil continued to increase, and now occurs all over the county. Bird vine and love vine again showed a decrease. Thrips occurred in the Mamoral Valley. Coconut diseases were kept under control, excepting budrot on one estate. Wither-tip of limes was severe. Mosaic disease of sugar cane appeared in the Couva district and eradication work was commenced.

GENERAL.—Some improvement was seen in the school garden work.

County of Victoria.

VISITS.—589 visits, entailing travelling of 5,280 miles were paid.

CROPS.—The crops of cacao and coffee were generally poor, and of coconuts good. Oranges were very scarce. Ground provisions were plentiful but the heavy rains spoilt the corn crop. The usual black eye pea crop, from the swamp lands, could not be grown as the lands remained under water in the dry season. Rice was also injured by floods.

DISEASES AND PESTS.—The continuous wet weather was directly unfavourable to the cacao beetle, and also assisted the recovery of affected trees which made remarkable growth. These factors, together with better control work as the result of the cacao beetle campaign, resulted in much less damage being done. Black pod disease of cacao was very slight, and chiefly in densely shaded fields. Algal disease and die back were as usual most prevalent in cacao on poor soil in exposed situations. Rosellinia root disease demands more attention by planters.

Red ring disease of coconuts was less in evidence, probably due to the increasing age of the trees, and very few cases were seen of either Bud rot or Little Leaf.

The attacks of Froghopper on sugar cane were very slight. Bird vine and love vine were in general less abundant. The latter as usual attacked hibiscus hedges but the wet season favoured the parasitic fungus which attacks it. Complaints about parasol ants were also fewer than usual.

GENERAL.—The inspection work for the Agricultural Bank is affording a useful opportunity of assisting cultivators. The school garden work unfortunately, excepting in a few cases, continues to be of a low standard.

County of St. Patrick.

VISITS.—1,022 visits were paid, including parasol ants destruction 480, cacao beetles 371, other diseases and pests 85, school gardens 58, Agricultural Bank 17. The mileage covered was 4,078.

CROPS.—Cacao improved much with the abundant rains; the crops were more satisfactory and cultivators did more work. Coconuts also improved in appearance, and gave a very good crop with a higher proportion of selects. Coffee on the other hand was exceedingly poor. The abnormally wet weather prevented some rice lands from being planted at all: other areas gave very fair crops. Corn and black eye peas failed completely. Fruit is very little grown in the county and what there is did not do well.

DISEASES AND PESTS.—Black pod disease of cacao was much less prevalent than usual. Canker is still much in evidence and cultivators do not give enough attention to it. Red ring disease of coconuts showed no increase. Thrips were rather more abundant. The Leaf spot disease of coffee increased, probably due to the wetter conditions.

Leaf eating insects were more abundant than usual.

GENERAL.—Sixteen estates were visited for the Agricultural Bank, and some very careful work is being done. The general standard of the school gardens showed a slight improvement.

Counties of Nariva and Mayaro.

VISITS.—1,344 visits were paid including 671 on instructional work to agriculturists, 327 cacao beetle, 262 other pests, 40 for the Agricultural Bank and 44 for school gardens. Mileage 3,171.

CROPS.—The cacao crop was very good. Coffee although only about 60 per cent. of the normal gave a better crop than in 1926. Much sugar cane was left unreaped owing to the wet weather and the ratoons did not spring well. Rice planting was reduced because of weather conditions: 200 acres of swamp rice gave about six barrels per acre, and 300 acres of hill rice about five barrels per acre. Ground provisions were plentiful.

DISEASES AND PESTS.—Pod rot and canker of cacao continued in evidence as also a little Rosellinia root disease. Thread blight was plentiful on both cacao and coffee. Coconut diseases showed a decrease, and there was not much withertip on limes.

Cacao beetles were plentiful early in the year, but afterwards could only be found in a few fields here and there. At Biche there were several, but not severe, attacks of thrips.

Leaf eating caterpillars were scarce, but mole crickets were abundant.

GENERAL.—There was a slight general improvement in school garden work, and very marked in one school Torrib Trace which came first in the Colony in the competition. Forty inspection reports were made on Agricultural Bank properties. The opening up of new lands was retarded by the very wet season and the necessity of repairing damage done by the drought of 1926.

Counties of St. David and St. Andrew.

CROPS.—The cacao and coconut crops were moderate, coffee and fruits poor, whilst rice and ground provisions, with the exception of yams, were good.

DISEASES AND PESTS.—Cacao beetles decreased owing to the weather, and to the educational effect of the cacao beetle campaign. Thrips did much damage in various districts. Black pod disease caused losses in the wetter months, but the recommendations to combat the disease by judicious shade reduction and attention to drainage are being adopted to an increasing extent.

With coconuts Red ring disease has caused the most damage. Many trees on poor or shallow soils, died as the result of the 1926 drought.

Coffee in the more humid districts, and particularly where grown under cacao, has again suffered from the leaf spot disease. Parasol ants have as usual received much attention; bird vine and love vine have also been dealt with.

GENERAL.—Over 70 estates have been inspected for the Agricultural Bank and improvements in cultural operations, &c., are being obtained as the result of advice given. The standard of work in the school gardens remains low.

County of Tobago.

VISITS.—797 visits were paid, and 5,903 miles traversed. The visits included 574 to peasant holdings to give general advice, 98 to school gardens, and 68 to estates. 69 agricultural meetings were also attended. One visit of a fortnight was paid to Trinidad to keep in touch with agricultural activities there.

CROPS.—A satisfactory cacao crop was obtained: it would have been better but for a dry spell in August. The coconut crop was good. The area under coconuts is being extended but in many cases on soils of very doubtful value for this crop. Coffee is being extended, but unfortunately too often under cacao. Pigeon peas, corn and yams had to be planted late, and suffered from the dry August weather so that the crops were poor.

DISEASES AND PESTS.—Red ring of coconuts is on the increase, with Bud rot as a secondary trouble. Many planters will not take sufficient care in burning diseased trees, and isolating affected areas as advised. Some, however, go to considerable expense in collecting fallen leaves, husks, &c., and burning them, often with damage to healthy trees.

Black pod and canker are still serious troubles to cacao, and cause a loss to the island which can safely be put at 25 per cent. of the crop, or 7,000 bags of cacao. The simple and practical remedies advised—shade reduction, better drainage, &c.—are regarded as too expensive by many, but when practised good results are seen.

Thrips did damage in several districts, but not so severely as in previous years. They appeared to be attacked by a white fungoid parasite. The ravages of the plantain weevil were partly masked by the heavy rains. An unusual outbreak of slugs on ground provision crops occurred in some localities.

GENERAL.—The school garden work was again very discouraging. Ten Agricultural Credit Societies continued in operation. Five have not yet met all their liabilities, but there is every indication that next year will show material improvement and the general outlook is encouraging.

The question of Co-operative Cacao Fermentaries, first discussed so long ago as 1918, was revived by Professor Shephard of the Imperial College whilst visiting the Societies.

W. G. FREEMAN,
Director of Agriculture.

20th December, 1928.

TABLE I.—Revenue and Expenditure.

	Expenditure.	*Revenue.*
	£ s. d.	£ s. d.
HEAD OFFICE :		
Personal Emoluments	7,048 11 6	343 15 0
Travelling and Other Charges	1,030 3 10	35 0 0
Laboratory Expenses	122 17 6	
Froghopper Investigation	3,412 4 5	(1) 1,478 3 5
Mongoose Campaign	742 6 4	(1) 128 12 4
Cacao Beetle Campaign	1,646 8 8	
BOTANICAL DEPARTMENT, TRINIDAD :		
Personal Emoluments	883 4 9	
Maintenance and Improvements, Royal Botanic Gardens and St. Clair Experiment Station	1,999 19 5	1,781 4 3
Care of Trees on Government Lands	99 3 11½	
Maintenance, Red House Grounds	64 16 11½	
Other Charges	405 16 7	
BOTANICAL DEPARTMENT, TOBAGO :		
Personal Emoluments, Travelling and Telephone Rent	306 15 0	95 11 7
Maintenance, Botanic Station and Government House Grounds	315 6 7½	
RIVER ESTATE :		
Personal Emoluments	609 0 0	
General Maintenance, &c.	3,386 6 2½	6,216 5 9
Improvements	190 2 5	
ST. AUGUSTINE EXPERIMENT STATION :		
Personal Emoluments	372 0 0	
Maintenance, Cultivation of Crops, &c.	2,593 7 8½	1,425 13 8
GOVERNMENT FARM, TRINIDAD :		
Personal Emoluments	419 3 4	
Maintenance	4,778 4 3½	
Purchase of Stock (Trinidad and Tobago)	379 13 9	7,468 14 1
GOVERNMENT FARM, TOBAGO :		
Personal Emoluments	160 5 0	
Maintenance	467 0 10½	244 11 11
GOVERNMENT VETERINARY SURGEON :		
Assistant Examiners and Contingencies	123 1 10½	1,176 0 0
QUEEN'S PARK AND PASTURES :		
Personal Emoluments	125 0 0	
Maintenance	1,592 18 7	312 5 3
AGRICULTURAL EDUCATION :		
Personal Emoluments, Travelling, &c.	2,457 16 7	
PLANT PROTECTION ORDINANCE :		
Travelling, &c.	56 9 9½	
Destruction of Pests	354 2 2½	
AGRICULTURAL CREDIT SOCIETIES :		
Personal Emoluments, Travelling, &c.	158 7 8	
	£36,300 15 10	£20,705 17 3

(1) Contributions by the Sugar Manufacturers' Association.

TABLE II.—Principal Agricultural Exports, Trinidad and Tobago.

	1926.		1927.	
	Quantity.	Value.	Quantity.	Value.
		£		£
CACAO :				
Raw Cacao	50,067,881 lb.	1,270,335	51,934,857 lb.	1,671,883
SUGAR CANE AND PRODUCTS :				
Vacuum pan, Grey Crystal	57,625¾ tons	871,156	28,315¼ tons	514,946
Do. White Crystal	2½ tons	54	3¼ tons	58
Do. Yellow Crystal	6,137½ tons	107,186	12,814½ tons	235,842
Molasses Crystal	1,410½ tons	17,872	570 tons	9,972
Muscovado Sugar	502¼ tons	6,960	102⅛ tons	1,548
Refined	250 lb.	2		
Molasses	1,427,274 gals.	14,330	1,188,840 gals.	14,471
Rum	71,213 gals.	10,933	35,699 gals.	8,155
Bitters	56,599 gals.	80,915	55,152 gals.	79,570
COCONUT AND PRODUCTS :				
Coconuts	5,041,036 No.	25,135	6,463,765 No.	32,298
Copra	13,858,996 lb.	166,263	12,498,983 lb.	146,895
Coconut Oil	82,791 gals.	15,373	58,061 gals.	11,102
COFFEE :				
Raw Coffee	497,688 lb.	20,371	163,920 lb.	7,238
RUBBER :				
Raw Rubber	163,399 lb.	19,251	141,887 lb.	11,625
LIMES :				
Lime Juice	7,886 gals.	1,926	4,488 gals.	1,154
Lime Oil	..	..	104 gals.	1,454
GRAIN, PULSE, STARCHES, &C. :				
Corn (Maize)	232,310 lb.	1,076	205,300 lb.	985
Peas and Beans	1,268,505 lb.	10,040	210,528 lb.	1,712
FRUIT :				
Oranges	1,273,090 No.	1,324	2,602,419 No.	2,760
Other kinds	..	425	..	1,779
MISCELLANEOUS :				
Plants and seeds	..	875	..	1,289
Spices (Nutmegs)	13,763 lb.	657	30,237 lb.	1,299
Honey	44,914 lb.	466	22,111 lb.	301
FOREST PRODUCTS :				
Cedar (undressed)	19,632 cu.ft.	3,085	62,282 cu.ft.	8,082
LIVE STOCK AND ANIMAL PRODUCTS :				
Live Stock	33 No.	384	71 No.	* 1,562
Hides and Skins	11,697 No.	11,940	8,298 No.	7,103
Leather (unmanufactured)	7,113 lb.	608	8,312 lb.	696
		2,658,942		2,775,779

* Exclusive of Poultry and Game valued at £13.

TABLE III.—ANNUAL RAINFALL 1862 TO 1927, PORT-OF-SPAIN, TRINIDAD.

1862 to 1899 at the Royal Botanic Gardens. January, 1900 onwards at the closely adjacent St. Clair Experiment Station.

Year.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual Rainfall.
	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Inches.
1862 ..	..	.66	.77	.25	1.41	8.47	10.36	9.57	11.97	6.60	10.06	3.03	63.15
1863 ..	1.54	2.71	1.45	.85	1.26	9.12	10.12	10.53	12.11	6.24	4.30	6.57	66.80
1864 ..	2.51	.53	.36	.04	8.15	4.96	7.17	12.06	8.04	6.53	5.94	6.61	62.90
1865 ..	2.62	3.20	1.07	7.98	3.22	5.64	10.35	14.83	7.32	14.62	4.81	9.62	85.28
1866 ..	2.24	3.91	1.44	1.09	1.45	6.59	7.83	12.34	5.87	10.11	8.17	6.82	67.86
1867 ..	1.31	6.36	.83	1.32	2.33	5.30	12.20	15.21	10.45	7.87	.67	2.71	66.56
1868 ..	2.06	.82	3.20	.64	4.17	7.78	11.35	6.73	5.46	4.66	8.31	1.03	56.21
1869 ..	.08	.93	.74	.41	.69	5.52	10.17	8.74	8.86	5.15	6.30	5.87	53.46
1870 ..	2.61	.56	1.46	1.51	4.65	8.81	11.91	9.00	10.63	3.98	5.94	8.29	69.35
1871 ..	6.62	1.40	2.89	.92	3.97	8.84	11.73	12.97	7.87	4.37	10.73	3.27	75.58
1872 ..	1.45	.07	.74	.39	3.14	7.09	5.45	10.82	3.07	4.80	9.89	3.04	49.95
1873 ..	1.78	1.08	1.98	.53	..	4.31	5.04	8.37	5.80	10.34	3.48	1.31	44.02
1874 ..	3.47	1.96	3.67	5.16	2.51	12.28	12.28	11.20	9.38	6.42	3.66	4.29	76.28
1875 ..	3.39	.91	.56	.42	2.61	4.15	12.62	7.22	11.95	10.85	3.74	2.48	60.90
1876 ..	3.26	1.03	1.78	1.67	6.65	11.17	12.23	15.18	12.03	7.04	5.95	3.96	81.95
1877 ..	2.14	..	7.46	3.38	3.19	8.43	8.35	12.94	6.39	6.68	7.66	5.48	72.10
1878 ..	3.44	.70	..	3.22	4.99	5.78	5.42	8.88	11.15	5.89	8.72	3.05	61.24
1879 ..	1.52	2.76	4.56	3.03	3.08	14.92	6.86	10.35	6.15	3.54	4.28	4.38	65.43
1880 ..	11.72	6.53	.67	2.32	3.90	7.83	6.30	17.39	7.47	5.74	10.51	1.96	82.34
1881 ..	.57	.65	.23	1.60	4.66	11.05	7.82	10.90	10.59	3.36	12.06	2.23	65.72
1882 ..	1.33	2.38	.73	1.57	3.74	6.33	5.93	8.40	4.93	5.86	10.29	1.50	52.99
1883 ..	1.56	.71	.26	3.37	5.89	10.91	13.66	10.26	5.53	3.99	6.06	8.30	70.50
1884 ..	3.43	2.50	4.40	1.51	2.91	6.84	5.71	8.70	5.03	5.05	5.14	5.66	56.88
1885 ..	1.30	.89	1.49	.43	5.27	3.44	5.87	4.56	6.08	4.08	5.37	4.44	43.22
1886 ..	3.32	1.97	3.27	3.83	4.49	9.70	17.48	8.15	6.73	12.59	8.54	6.75	86.82
1887 ..	2.69	1.46	1.67	1.08	3.98	7.40	5.51	9.93	5.07	5.84	7.60	11.86	64.09
1888 ..	8.37	1.79	2.41	2.28	3.46	11.92	6.89	7.02	5.53	5.06	7.76	2.95	65.44
1889 ..	.94	.85	4.16	1.05	6.34	11.66	12.14	11.73	3.76	6.30	7.38	7.48	73.79
1890 ..	7.76	.51	2.09	7.62	5.14	9.68	12.89	11.65	3.37	10.98	5.93	5.28	82.90
1891 ..	3.17	.92	.03	1.44	2.54	5.54	11.88	4.26	7.44	5.77	6.66	4.09	53.74
1892 ..	1.93	2.19	1.85	7.59	11.55	16.26	15.55	9.21	3.57	11.49	5.40	4.69	91.28
1893 ..	3.43	1.85	.19	3.61	11.35	10.19	13.28	16.32	11.73	5.47	7.84	7.23	92.49
1894 ..	3.22	2.36	3.12	1.22	2.69	3.26	4.53	12.06	5.48	3.93	7.28	3.16	52.31
1895 ..	2.52	1.33	2.27	2.52	2.11	5.00	2.57	4.86	5.69	10.89	15.15	7.32	62.23
1896 ..	7.08	.88	1.59	2.33	1.62	10.29	6.35	7.66	6.46	6.05	9.81	6.33	66.45
1897 ..	1.67	.75	3.96	.26	5.58	11.19	13.88	7.90	9.83	8.87	9.39	4.40	77.68
1898 ..	3.05	2.18	2.10	1.17	1.49	6.46	5.87	10.55	7.13	6.15	9.13	3.57	58.85
1899 ..	1.95	1.82	1.00	.75	.52	7.63	4.44	8.45	2.18	6.34	8.07	3.61	46.76
1900 ..	3.56	.76	2.72	4.10	4.14	12.99	7.95	11.07	5.52	6.53	5.41	2.61	67.36
1901 ..	1.95	1.51	1.85	.35	6.45	9.21	8.38	7.53	4.26	4.97	7.93	4.83	59.22
1902 ..	2.56	.51	1.18	1.78	2.14	10.05	5.20	11.67	7.22	7.40	2.74	2.89	55.34
1903 ..	1.51	.68	1.54	2.17	.95	5.42	9.40	9.45	11.41	2.12	2.59	4.20	51.44
1904 ..	3.00	2.56	4.24	2.50	2.76	6.23	8.03	4.72	8.81	5.65	3.61	4.32	56.43
1905 ..	2.41	.59	3.74	1.79	4.34	6.01	9.49	11.09	10.43	6.94	10.69	4.16	71.68
1906 ..	.43	.50	.73	.46	7.96	10.95	11.42	8.55	6.54	6.80	5.00	5.64	64.98
1907 ..	5.22	.44	1.71	.09	4.58	11.01	11.02	5.77	7.76	7.65	10.69	4.10	70.04
1908 ..	.75	.45	1.79	.95	5.82	5.22	5.87	7.72	5.45	5.45	2.65	8.68	50.80
1909 ..	5.69	2.43	1.15	1.78	3.87	8.31	10.72	6.29	6.95	7.15	3.93	6.31	64.58
1910 ..	2.79	4.38	1.75	2.01	2.76	6.34	6.40	13.89	8.27	9.21	8.49	1.90	68.19
1911 ..	1.61	1.51	1.86	.74	1.27	7.15	5.20	13.68	4.03	10.22	3.57	3.53	54.37
1912 ..	.62	Nil.	.74	.03	2.18	7.54	12.16	5.56	5.87	2.73	6.28	5.64	49.35
1913 ..	2.80	.50	1.42	.42	1.79	2.80	2.86	6.48	6.52	3.51	3.61	1.82	39.53
1914 ..	.50	.61	1.28	1.01	2.05	7.34	5.05	9.15	7.80	6.14	7.61	5.58	54.12
1915 ..	2.10	.66	..	2.63	2.76	7.05	12.76	5.27	4.21	9.28	7.84	1.75	56.31
1916 ..	5.29	1.35	1.57	1.91	.94	10.30	8.04	11.57	10.78	6.68	9.32	1.98	69.73
1917 ..	1.17	3.06	1.38	.50	4.24	6.30	10.13	9.96	7.24	5.43	6.61	8.22	64.24
1918 ..	3.15	1.18	1.48	1.27	2.94	5.87	14.42	8.56	8.93	5.51	7.56	3.85	64.72
1919 ..	.62	..	1.78	1.67	3.50	6.78	5.17	6.82	7.96	7.79	8.42	6.67	57.18
1920 ..	1.39	1.66	.94	.28	.56	4.13	4.93	6.70	10.98	5.74	6.03	1.60	44.94
1921 ..	2.43	1.60	5.03	4.09	1.43	9.91	10.06	10.30	10.17	6.53	7.71	6.25	75.51
1922 ..	4.01	1.13	1.41	2.39	2.18	6.10	5.06	8.35	6.49	2.92	11.17	7.10	58.31
1923 ..	1.91	1.66	.96	2.97	1.46	3.48	10.76	9.37	6.23	4.41	7.38	7.32	57.91
1924 ..	1.54	.90	.14	1.11	.73	4.95	7.53	7.27	4.59	7.81	8.56	2.15	47.28
1925 ..	1.77	1.06	2.67	.10	1.21	4.20	7.58	8.87	6.37	5.85	5.36	4.36	49.40
1926 ..	.69	.39	.54	.23	2.12	5.26	5.25	10.85	11.20	14.78	9.71	7.56	68.58
1927 ..	4.71	4.44	3.62	5.04	7.15	6.95	9.40	11.67	9.11	6.13	5.64	7.21	81.07
Grand Total ..	179.23	100.63	121.67	124.73	230.98	509.69	580.23	635.08	487.17	440.83	469.09	316.85	4,198.11
Average for 66 years ..	2.71	1.52	1.84	1.89	3.50	7.72	8.79	9.62	7.41	6.68	7.11	4.80	63.61